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SUPPLEMENTARY STATISTICAL STUDIES OF THE CHILDREN IN THE CHICAGO PUBLIC SCHOOLS FOR THE DEAF

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Over a year ago we published the first installment of these statistical studies [1] carried out under the auspices of the National Research Council and the direction of Dr. Charles W. Richardson, chairman of the Committee on the Physical Survey of Schools for the Deaf. We are reporting here the conclusion of these studies carried out under the same auspices, with financial assistance from the Chicago Institute of Medicine. The earlier report was concerned with general questions relating to deafness in children, such as whether the defect was congenital or acquired, the etiology of the acquired cases, the relation of hereditary deafness to consanguinity, the status of hearing—whether deafness was total or partial in the two types of cases, congenital or acquired—and the presence or absence of vestibular responses.

In this report we have undertaken to analyze the hearing function with the particular object of determining the relations between the various functional tests, and the relation of these tests to the important problem of defects in speech, which are such a conspicuous handicap in many deaf children. The audiometer used was the Western Electric 2-A model, which was lent to us by the Graybar Electric Company.

In these studies, as in the previous reports, we made diagrammatic statistical tables as the simplest method for presenting the several relations. Special tables were made to show the relation of the Schwabach reaction to the audiometer reaction in the cases of acquired and congenital deafness; the relation of the Rinne reaction, unilateral and bilateral, to the audiometer reaction; total deafness for the voice, showing the audiometer reactions and the degree of hearing for the tuning forks in congenital and acquired deafness; the relations of audiometer

1. Shamburgh, G. E., and others: Statistical Studies of the Children in the Chicago Public Schools for the Deaf, Arch. Otolaryng. **2**:417 (Nov.) 1925.

reactions and other tests for hearing to speech defects, with an analysis of those with hearing for the audiometer, showing the number with hearing above 2,000 double vibrations only, those with hearing below 2,000 double vibrations only, and, finally, those with remnants of hearing both above and below 2,000 double vibrations; analysis of cases in which

THE SCHWABACH TEST

TABLE 1.—*Schwabach Test 190 Cases*

Bone conduction absent..... 107	Total defect for audiometer 34	Congenital 21		
		Acquired... 13	Associated with otitis media..... 1	
			Not associated with otitis media..... 12	
	Remnant of hearing for audiometer..... 73	Congenital 50		
		Acquired... 23	Associated with otitis media..... 5	
			Not associated with otitis media..... 18	
Bone conduction shortened..... 66	Total defect for audiometer 2	Congenital 0		
		Acquired... 2	Associated with otitis media..... 0	
			Not associated with otitis media..... 2	
	Remnant of hearing for audiometer..... 66	Congenital 25		
		Acquired... 41	Associated with otitis media..... 14	
			Not associated with otitis media..... 27	
Bone conduction normal..... 7	Total defect for audiometer 0	Congenital 0		
		Acquired... 0		
	Remnant of hearing for audiometer..... 7	Congenital 0		
		Acquired... 7	Associated with otitis media..... 5	
			Not associated with otitis media..... 2	
Bone conduction prolonged..... 8	Total defect for audiometer 0	Congenital 0		
		Acquired... 0		
	Remnant of hearing for audiometer..... 8	Congenital 1		
		Acquired... 7	Associated with otitis media..... 6	
			Not associated with otitis media..... 1	

there were marked speech defects, showing the relation of this condition to remnants of hearing as shown by audiometer and other tests, and the presence of bone conduction; and, finally, a table of the cases in which there were no marked speech defects, showing relations with the status of hearing for various functional hearing reactions.

We undertook the analysis of the statistics in connection with the Schwabach tests, that is, the test of bone conduction, because the presence or absence of bone conduction should play an important part in a child's ability to acquire skill in vocalization. The ability to recognize pitch from tactile sensation when using tuning forks is, of course, restricted to those forks which produce rather extensive excursions, that is, those near the lower end of the tone scale. A deaf person may recognize the pitch of a fork without appreciating the actual tone sensation.

One hundred and ninety of these children were examined by the Schwabach test. We utilized the "A" unclamped Bezold fork as the one apparently best suited for our purpose. It is an unusually well made fork, in which the sound dies out slowly and is high enough in the scale to have a clear tone, as distinguished from the tactile sensation of the lower forks, and yet it is low enough in pitch that bone conduction is always readily appreciated when any hearing is left. In 107 of these 190 cases there was complete absence of bone conduction; the "A" fork, in other words, was not heard. In sixty-eight cases bone conduction was present, but was much shortened as compared with that in a normal ear. In seven cases bone conduction did not show reduction from the normal, and in eight there was actual prolongation of bone conduction; that is, forks used in the Schwabach test were heard longer than in normal ears. These results are what one would expect. In children so deaf that they must be in a special school, we would expect the majority to have so little hearing left that the forks used in the Schwabach test would either not be heard, or would be heard for only a short time.

We followed the simple principle laid down by Bezold of applying the tuning fork to the vertex, median line, and determining the pressure entirely by the weight of the fork itself. In this way we could be absolutely sure that discrepancies could not creep in because of a failure to use the same pressure in applying the fork. It is, of course, impossible to test bone conduction separately for the two ears. It is only in exceptional instances that a tuning fork applied to the mastoid in a case in which we know there is a total defect is not heard exactly as long as when applied to the opposite normal ear.

Of the 107 cases which showed a complete absence of bone conduction for the "A" fork, thirty-four showed a total defect for the audiometer, and in seventy-three cases there were remnants of hearing for this instrument. Of the thirty-four cases showing a total defect for the audiometer, twenty-one were congenital and thirteen were acquired. Of the latter cases, one was associated with otitis media and twelve were not.

Of the seventy-three patients who had vestiges of hearing for the audiometer, fifty were congenitally deaf and in twenty-three the deaf-

ness was acquired. In five of the latter, deafness occurred with otitis media and in eighteen without otitis media.

Eighty-three of the 190 cases showed the presence of bone conduction. In sixty-eight cases bone conduction was distinctly shortened; only two of these patients showed a total defect for the audiometer and sixty-six showed remnants of hearing as determined by this device. In both the cases showing total loss of hearing for the audiometer, the deafness was acquired and occurred without otitis media.

In twenty-five of the sixty-six cases with remnants of hearing for the audiometer, the deafness was congenital and in forty-one it was acquired. Fourteen of the latter occurred with, and twenty-seven without, otitis media. In seven, the duration of bone conduction was normal and remnants of hearing could be determined by the audiometer. Of the seven patients who had vestiges of hearing for the audiometer and in whom the bone conduction was normal, all had acquired deafness; in five it was associated with otitis media and in two it was not. In cases of congenital deafness, we should expect the nerve deafness to lower the bone transmission; whereas in the cases of acquired defects, even when the nerve defect is extensive, when there is also an obstruction in conduction, the duration of bone conduction may be normal or even prolonged. This is a common occurrence in advanced oto is. The observations in the cases of these children is, therefore iving what we would expect.

In the eight cases in which bone conduction was claimed to be longer than for persons with normal hearing, all showed hearing for the audiometer. One of these cases was congenital deafness, and seven were acquired; six of the latter occurred with otitis media and one without.

The fact that in six of these cases there was a history of otitis media gave a clue as to why the hearing is prolonged for a longer time. Prolongation of bone conduction is a phenomenon of fixation of the conduction mechanism. The symptom stands out most conspicuously in true otosclerosis with bony ankylosis of the stapes. As is well known, in these cases the reaction to the Schwabach test occurs even after the degenerative process in the labyrinth, which accompanies advanced cases of otosclerosis, has proceeded to a point at which the spoken voice can be heard only with the greatest difficulty.

We selected the Rinne test for statistical studies because this test stands out as the most important functional test in determining where the lesion is located, whether it is due to an obstruction in the sound-conducting mechanism or whether the defect is the result of a lowered sensibility of the nervous mechanism, which makes it incapable of responding acutely to impulses of sound waves. The Rinne test is more complicated than the Schwabach test, and for a correct interpretation of

results requires skill and a proper background of clinical experience. The fundamental principles of the test are simple. Normally, the tuning fork is heard longer and better (louder) when held before the meatus than when placed on the mastoid process. We speak of this reaction as Rinne positive.

This positive response of the Rinne test persists in all degrees of nerve deafness that are bilateral, provided that some hearing for the fork used is still preserved. In unilateral nerve deafness the positive Rinne reaction occurs only when there is a moderate defect in hearing. In all cases of unilateral deafness in which the defect is marked, includ-

THE RINNE TEST

TABLE 2.—*Rinne Test 212 Cases*

Positive Rinne 39	Unilateral..18	Total defect for audiometer..... 0		
		Remnant of hearing for audiometer 18	Above 2,000..... 0	
			Below 2,000..... 6	
			Both above and below 2,000. 12	
	Bilateral...21	Total defect for audiometer..... 0		
		Remnant of hearing for audiometer 21	Above 2,000..... 0	
			Below 2,000..... 7	
			Both above and below 2,000. 14	
[illegible]inne 33	Unilateral.. 4	Total defect for audiometer..... 0		
		Remnant of he ring for audiometer 4	Above 2,000..... 0	
			Below 2,000..... 0	
			Both above and below 2,000. 4	
	Bilateral...29	Total defect for audiometer..... 0		
		Remnant of hearing for audiometer 29	Above 2,000..... 0	
			Below 2,000..... 8	
			Both above and below 2,000. 21	
Absolute Negative Rinne 140	Unilateral..18	Total defect for audiometer..... 2		
		Remnant of hearing for audiometer 16	Above 2,000..... 0	
			Below 2,000..... 8	
			Both above and below 2,000. 8	
	Bilateral..122	Total defect for audiometer..... 33		
		Remnant of hearing for audiometer 89	Above 2,000..... 0	
			Below 2,000..... 62	
			Both above and below 2,000. 27	

ing cases of unilateral total loss of hearing, the Rinne reaction for the deaf ear can only be negative. When, on the other hand, there is an interference with the sound waves reaching the labyrinth via the conducting mechanism, external auditory meatus, drum membrane, chain of ossicles, and tympanic cavity, the margin of difference for the acuity as well as the duration between air and bone conduction is diminished in direct ratio to the degree of deafness. This alteration in the relations between air and bone conduction is not dependent entirely on the interference of sound waves reaching the labyrinth from the obstruction to sound conduction, but on the fact that when there is an interference with sound conduction an actual prolongation of the bone conduction develops.

The more marked this prolongation, the more profound is the deafness. It is particularly conspicuous in those cases in which the interference with sound conduction centers around the key to the conducting mechanism, namely, the footplate of the stapes. The cause of the fixation is of minor importance; the main factor is whether or not it is a solid fixation.

The reason the interpretation of the Rinne test presents difficulties not found in the Schwabach test is that in testing one ear we cannot exclude bone conduction from the opposite ear. The proper evaluation of the significance of the Rinne reaction requires the exercise of that judgment which only a proper background of clinical experience can give. A person with a moderate defect in hearing will continue to give a Rinne positive reaction when the defect is the result of obstruction in the conducting mechanism just as in nerve deafness. A person with an advanced defect in hearing will always give a negative Rinne reaction when the defect is caused by nerve deafness as well as when it is caused by obstructive lesions, provided the hearing in the opposite ear is normal.

From these general observations regarding the Rinne test, it will be understood why this test may not be positive even in children in whom the defect in hearing is severe enough to necessitate their being instructed in a school for the deaf; that is, in children whose defect can result only from more or less profound alteration in the sound-perce[illegible] mechanism.

The Rinne reaction was recorded in 212 cases. This is more than the total number of children examined, because some of the cases in which the two sides gave different results were recorded twice. In thirty-nine cases we obtained a positive Rinne reaction; in thirty-three, a negative Rinne reaction, and in 140 the Rinne was an absolute negative. In the last mentioned group, there was no hearing for air conduction; only the bone conduction existed. Of the thirty-nine cases giving a positive Rinne reaction, eighteen were positive in only one ear and in twenty-one the reaction was bilateral. In none of these thirty-nine cases was there a total defect for the audiometer. This should obtain, since a total defect to the audiometer would always seem to indicate total deafness, and in such a case a positive Rinne reaction would not be expected. Of the eighteen cases in which the positive Rinne was unilateral, six showed remnants of hearing only below 2,000 double vibrations; in twelve, remnants of hearing were found both above and below 2,000 double vibrations; in none was there a remnant of hearing above 2,000 double vibrations only. Of the twenty-one cases in which the Rinne test was positive for both ears, seven showed remnants of hearing below 2,000 double vibrations and fourteen showed remnants of hearing both above and below 2,000 double vibrations.

Of the thirty-three cases in which the Rinne reaction was negative, that is, in which there was hearing both by air and bone conduction for the tuning fork, four gave a unilateral reaction. All of these showed remnants of hearing for the audiometer with hearing both above and below 2,000 double vibrations. Of the twenty-nine in which the negative Rinne reaction was bilateral, all showed remnants of hearing for the audiometer. In eight it was below 2,000 double vibrations and in twenty-one there was hearing both above and below 2,000 double vibrations.

An absolute negative Rinne test, that is, inability to hear by air conduction, although bone conduction still existed, was found 140 times—eighteen times unilateral and 122 times bilateral. Of the eighteen cases showing an absolute negative Rinne reaction only in one ear, two

TOTAL DEAFNESS FOR THE VOICE

TABLE 3.—*Total Deafness for Voice, 108 Cases*

Total deafness for audiometer..... 33	Total deafness for forks, bone and air conduction. 33	Congenital.....21		
		Acquired.....12		
	Remnants of hearing for forks, 0			
Remnants of hearing for audiometer..... 75	Total deafness for forks, bone and air conduction. 58	Congenital.....35		
		Acquired.....23		
	Remnants of hearing for forks..... 17	Bone conduction..3	Congenital... 1	
			Acquired..... 2	
		Air conduction...14	Congenital... 8	
			Acquired..... 6	

showed a total defect in this ear for the audiometer, and in the remaining sixteen remnants of hearing existed. Of the latter, eight showed remnants below 2,000 double vibrations and eight remnants both above and below 2,000 double vibrations.

Of the 122 cases in which the absolute negative reaction was bilateral, thirty-three showed total deafness and eighty-nine showed remnants of hearing for the audiometer. Sixty-two showed hearing only below 2,000 double vibrations. In twenty-seven hearing was found both above and below 2,000 double vibrations.

The results of the Rinne test indicate that in comparison with the Schwabach test, in which the majority of the cases showed a loss of bone conduction, we have here a large majority in which the Rinne test gives an absolute negative reaction. The figures for these two tests thus corroborate each other.

We found altogether 108 cases in which there was total deafness for the voice. Of these, only thirty-three showed total deafness for the audiometer, while in seventy-five cases, remnants of hearing could be

discovered by means of this device. All of the thirty-three cases in which there was total deafness for the audiometer showed a total deafness for forks by both bone and air conduction. In twenty-one of these cases, deafness was congenital; in twelve, it was acquired. It is clear, therefore, that both forms of deafness, the congenital and acquired, may be absolute.

Of the seventy-five patients who showed remnants of hearing for the audiometer, fifty-eight showed total deafness for forks by both bone and air conduction, and in seventeen, remnants of hearing for forks still existed. Of the fifty-eight patients who showed total deafness for the forks, by bone and air conduction, but who retained remnants of hearing for the audiometer, thirty-five had cases of congenital deafness and twenty-three acquired. This shows that the developmental anomalies

RELATIONS OF THE AUDIOMETER REACTIONS TO OTHER TESTS

TABLE 4.—*Relation of Audiometer Reactions to Other Tests, 197 Cases*

Total deafness for all tests, 35	Marked speech defect.....31		
	Without marked speech defect.. 4		
Remnants of hearing, 162	For audiometer and other tests.....99	Marked speech defect....33	Remnants: Above 2,000..... 0; Below 2,000.....15; Both above and below 2,000.....18
		Without marked speech defect.....63	Remnants: Above 2,000..... 0; Below 2,000.....13; Both above and below 2,000 50
	For audiometer; other tests negative.....66	Marked speech defect....52	Remnants: Above 2,000..... 0; Below 2,000.....48; Both above and below 2,000..... 4
		Without marked speech defect.....14	Remnants: Above 2,000..... 0; Below 2,000.....12; Both above and below 2,000..... 2
	Hearing for other tests; audiometer negative..... 0		

responsible for congenital deafness often leave remnants of hearing, exactly as do the acquired defects. Of the seventeen cases in which hearing for the audiometer could be demonstrated and in which the forks were still heard, three preserved bone conduction and fourteen preserved air conduction also. Of the three cases showing bone conduction, one was a case of congenital deafness and two were acquired. Of the fourteen showing the preservation of air conduction, eight were congenital deafness and six acquired.

We particularly desired to compare the audiometer results with other tests and with the presence or absence of speech defects. One hundred and ninety-seven children were studied with this in view. Thirty-five of these had total deafness proved by all tests, and 162

had remnants of hearing. Of the thirty-five in whom there was total deafness for all tests, thirty-one showed marked speech defects. Just how to account for the latter, we did not know. It would be interesting to make a more detailed study of cases of this type. It is probable that the defect in hearing came on after the patient had already acquired the art of speech.[2]

In 162 children some remnants of hearing were found. In ninety-six of these, hearing was shown with both the audiometer and the other tests, and in sixty-six with the audiomter alone. In not a single case was there hearing for other tests when the audiomter reactions were negative; in other words, when remnants of hearing are present, they are always brought out by the audiometer. When none are found by this instrument, the fork tests will also probably be negative.

Of the ninety-six patients in whom remnants of hearing existed for the audiometer as well as for the other tests, thirty-three showed marked speech defects and sixty-three showed only a slight speech defect. Of the thirty-three with a marked speech defect, the remnant of hearing was found to be located below 2,000 double vibrations in fifteen, and in eighteen there were remnants both above and below 2,000 double vibrations. In none was there a remnant of hearing above 2,000 double vibrations only.

Of the sixty-three patients without marked speech defect, the remnant of hearing as detected by the audiometer was below 2,000 double vibrations in thirteen and both above and below 2,000 double vibrations in fifty. We found remnants of hearing above 2,000 double vibrations only in this group.

Of the sixty-six patients in whom there were remnants of hearing for the audiometer but in whom the tests for the voice or tuning forks were negative, fifty-two had marked speech defects. Forty-eight of the latter showed remnants of hearing below 2,000 double vibrations; four, remnants of hearing both above and below 2,000 double vibrations.

Of the fourteen children with marked speech defects, twelve had remnants of hearing below 2,000 double vibrations, and two showed remnants both above and below 2,000 double vibrations.

We prepared a special chart of cases showing marked speech defects and one showing those without marked speech defects, in order to get as many angles as possible on this symptom which is so important in the life of the individual. Retaining of the natural voice preserves for the deaf the pleasure of intellectual intercourse with others, which is

2. Examination of records showed that of these four cases, two were cases of congenital syphilis, one of meningitis at 4 years of age, and the fourth that of fever (?) at 2 years.

largely denied to those who have a speech defect so marked that the voice can hardly be recognized as human.

Of course, in any person who has practically no hearing or who is so deaf that his education has to be conducted in an institution, there are likely to be alterations of the voice which it would be proper to term defects of speech. When using this term we have in mind particularly those alterations so marked that the speech is difficult to understand. Sometimes the voice is of low pitch; sometimes it is high, and sometimes there is a mixture of both. Often there remains little that resembles the human voice.

DEAFNESS WITH MARKED SPEECH DEFECT

TABLE 5.—*Cases with Marked Speech Defect, 116 Cases*

Total deafness to all tests			31
Remnants to audiometer and other tests, 33	Bone conduction present	20	Hearing remnant: Above 2,000 — 0 Below 2,000 — 10 Both above and below 2,000 — 10
	Bone conduction absent	13	Hearing remnant: Above 2,000 — 0 Below 2,000 — 5 Both above and below 2,000 — 8
Total deafness to other tests; remnants to audiometer		52	Hearing remnant: Above 2,000 — 0 Below 2,000 — 48 Both above and below 2,000 — 4
Total deafness to audiometer; remnants to other tests		0	

TABLE 6.—*Cases Without Marked Speech Defect, 81 Cases*

Total deafness for all tests			4
Remnants for audiometer and other tests, 63	Bone conduction present	56	Hearing remnant: Above 2,000 — 0 Below 2,000 — 11 Both above and below 2,000 — 45
	Bone conduction absent	7	Hearing remnant: Above 2,000 — 0 Below 2,000 — 4 Both above and below 2,000 — 3
Total deafness for other tests; remnant for audiometer		14	Hearing remnant: Above 2,000 — 0 Below 2,000 — 13 Both above and below 2,000 — 1
Total deafness for audiometer; remnant for other tests		0	

There were 116 children who showed such marked speech defects. Thirty-one of these showed defects for all tests—voice, tuning forks and audiometer—and, to our surprise, remnants of hearing were found in the remaining eighty-five. In thirty-three cases, remnants were detected not only by the audiometer but also by other tests, and in fifty-two by the audiometer only. In none of these children did we ever find remnants of hearing for other tests when the audiometer showed total deafness.

Of the thirty-three children who had marked defects of speech and who showed remnants of hearing for the audiometer as well as for other tests, twenty retained bone conduction, and of these, ten showed vestiges

of hearing for the audiometer below 2,000 double vibration and ten had remnants of hearing both above and below 2,000 double vibrations. Thirteen of the thirty-three cases showed an absence of bone conduction; in five a remnant of hearing was found only below 2,000 double vibrations, and in eight both above and below 2,000 double vibrations. It is evident, therefore, that a marked speech defect may exist, even when some bone conduction is preserved. It is interesting to note, however, that of the 116 patients, fifty-two showed remnants of hearing only for the audiometer, there being an absence of hearing for other tests, including bone conduction. In forty-eight of the fifty-two there was a vestige of hearing below 2,000 double vibrations, and in four this was found both above and below 2,000 double vibrations.

Eighty-one children were studied who did not show a marked defect of speech. Only four of this number showed total deafness for all tests. In sixty-three the examination disclosed remnants of hearing for the audiometer as well as for other tests. In this number, fifty-six retained bone conduction and in only seven was bone conduction absent. Of the fifty-six cases in which bone conduction was retained, remnants of hearing existed below 2,000 double vibrations only in eleven cases and both above and below 2,000 double vibrations in forty-five. Of the seven who did not show bone conduction, four had remnants of hearing below 2,000 double vibrations only and three both above and below 2,000 double vibrations.

Fourteen of the eighty-one children without marked speech defects were found to be totally deaf for other tests, but to have retained remnants of hearing that were discovered by the audiometer. In thirteen of these cases this type of hearing existed below 2,000 double vibrations only and in one both below and above 2,000 double vibrations.

No children without marked speech defects showed total deafness for the audiometer but hearing for other tests.

The results of this study show that a child whose speech is not markedly defective usually has remnants of hearing both for the fork tests and for the audiometer. It is also shown that most of the remnants of hearing are below, or above and below 2,000 double vibrations, since we did not find any above 2,000 double vibrations alone.

CHRONIC RHINOPHARYNGEAL DISEASE

BURT R. SHURLY, M.D.

DETROIT

A consideration or discussion of chronic rhinopharyngeal disease must be limited to one of its scientific phases under the various classifications so voluminously outlined in the special literature, namely, nasal obstruction. I shall not discuss a highly specialized surgical technic, but some of the practical problems encountered in a long and constant daily contact with the various manifestations of chronic nose and throat disease.

While the success of treatment must depend largely on diagnosis, operative skill, technic and after-care, too much attention can hardly be given to the psychologic phase of the subject.

The diagnosis of all chronic rhinopharyngeal disease from the standpoint of the patient is catarrh, tonsillitis, chronic cold or among the more intelligent, sinus trouble. A vastly increasing number of people select their specialist on a self-satisfied classification of their disease. It seems to me, therefore, of considerable importance that in a scientific determination of successful diagnosis and treatment, an analysis of the patient's mental attitude should be given a more searching study. It is not infrequent to find imaginary or hysterical states greatly accentuated in this special field. As the number of referred cases decreases with the higher education of the masses who select their own specialist, the danger of overlooking the essential etiology increases and the interrelationship of ophthalmology, otolargyngology and internal medicine becomes more and more important. If rhinologists are to meet successfully the problems of chronic rhinopharyngeal disease, they must broaden their interest and knowledge to include borderline problems. Pathologic processes have never held to strictly arbitrary lines. Underneath these problems are the ever operating laws of immunity. The virulence of the micro-organism and the resistance to infection often determine the results. With the laws of immunity, the rôle of the endocrines and the supply of vitamins must be studied constantly. The research laboratory is solving biochemical problems with the prophecy of modifying and eliminating some of the present day principles and practice of nose and throat surgery.

The relationship of the eye to the nose has been recognized for many years. The contiguity of structure, the venous route and the lymphatics make the relationship interdependent. The important interrelationship of nasal disease, anatomic anomalies and sinus infection has been demonstrated most forcibly by the studies of Loeb, Onidi, Stucky, deSchweinitz

and others. Neuroretinitis, papillitis, choked disk, optic atrophy and exophthalmos, together with systemic infection regarded as neurasthenia, rheumatism of low grade and septicemia require careful examination for suppuration, pressure in the sphenoidal cells or the ethmoidal labyrinth. While these facts are well known, the pathology is often overlooked. Pressure against the antral or septal walls may be relieved by removal of the offending middle turbinate.

When these elementary surgical principles and a standardized choice of technic are thoroughly understood and applied, the relief of chronic rhinopharyngeal disease will ultimately depend on more advanced research that will deal with the prophylactic measures which afford better immunity and cell growth. The rapid transportation of septic or chemical material through the network of the lymphatics to the cerebrospinal system can scarcely be realized until one performs the experiment of Cushing, and injects 10 grains (0.65 Gm.) of urotropin into the rectum. In from one and one half to three minutes, spinal and ventricular punctures will contain this chemical substance. Infection must then be considered and measured not only in its local manifestations, but also as a continuous and constant systemic process.

It is necessary only to observe the dermographia of the goiter patient to realize the close and rapid interrelationship of the local vasomotor mechanism of the nose and throat with that of the general system.

EFFECTS OF NASAL OBSTRUCTION

The remote effects of nasal obstruction on the respiratory organs and the body at large are best demonstrated by the experiments of Anderson at the Detroit College of Medicine. A series of 100 guinea-pigs, rabbits and dogs were subjected to partial or complete closure of the nostrils by the use of cotton or collodion or by denuding the nasal surface and suturing while the animal was under ether. All guinea-pigs with complete stenosis died from two to eight hours later, with marked distention of the abdomen from swallowing air. Guinea-pigs with one nostril closed died in from two hours to nine and three fourths days, although two lived eight months. Rabbits with one nostril closed died on an average within forty-five days. Those living the longest developed asthma and emphysema, infection and acute dilatation of the heart. Puppies died in sixty days. Of fourteen puppies born of mothers with a two thirds nasal obstruction, eleven died within sixty-one days. Older dogs developed the signs of scurvy with almost complete loss of hair and great wrinkling of the skin.

These experiments on animals show that:

1. Nasal obstruction leads to death or serious impairment of vitality.
2. It leads to lowered resistance, predisposition to infection.
3. Local disease of the respiratory tract is induced.

4. Obstruction of the nostril leads to dilatation of the heart.

5. Changes in the skin and blood are most marked.

6. Symptoms resembling asthma and emphysema often occur with histologic change.

7. Reopening of the occluded nostrils is followed by prompt disappearance of the symptoms.

These experimental proofs of the profound systemic and toxic effects of nasal stenosis are undoubtedly in direct relation to the toxic effect of the disturbed blood chemistry. The importance of intestinal toxemia and its relation to acute and chronic inflammations in the ear, nose and throat is well known, but the relation of disturbed lung chemistry and the air contained in the lungs is a newer field that is not sufficiently appreciated. The exchange of oxygen and carbon dioxide and the elimination of excrementitious material, organic substances and watery vapor are elementary fundamentals of physiology. The relation of the proper discharge of the 100 cubic inches or more of residual air, especially from the apexes of the lung, and its toxins to the problems of obstructed nasal respiration is a new chapter with faint elucidation. Digitalis, ergot and quinine have a distinct physiologic action according to the mechanism of cell selection. The toxins of residual air have a definite action on the cell, as demonstrated by Delos Parker at the Detroit College of Medicine. If the residual air is blown into a basin containing a solution of lime water and the same is evaporated, a fine layer of snowy white crystals will remain. The chemical combination is redissolved in distilled water and injected in a series of varying strengths into a pigeon and a dog. An increasing disturbance of cell chemistry takes place, with the selective action of the poison manifested particularly on the ectodermic tissues. The hair or feathers fall partially or completely as the toxemia advances. The animal becomes bald. If costal breathing is accentuated in the dog by means of a corset, the hair is rapidly restored.

The effects of nasal obstruction may therefore be most remote and hidden in the blood chemistry. It is true that persons with most complete nasal occlusion may go through life apparently without any detrimental effects. The value of and the necessity for surgical intervention must be considered carefully. The indications for a submucous resection of the nose or the removal of tonsils and adenoids, together with other obstructive lesions, have classical rules of application of definite value. The future may add other indications observed in the blood chemistry and measured by laboratory methods. It is my belief that the work of the rhinologist does not end with the simple surgical procedure. It is taken for granted that all pathologic tissue is removed, although the percentage left is from 1 to 5 at least, especially when only the LaForce adenotome is used for that operation.

TREATMENT OF RHINOPHARYNGITIS

Many children of the lymphoid type, those with lowered resistance to infection, those with cervical adenitis not relieved by operation for sinuses and nasal obstruction and those with recurring otitis media and so-called respiratory catarrh respond surprisingly to nature's remedy that all the tissues call for and which is almost as plentiful as air, namely, a simple household remedy made in the kitchen. The components, plucked from the garden, are: two potatoes, two carrots, two beets, two tomatoes and a bunch of celery squeezed through a meat press, strained and placed in the refrigerator and served with salt and pepper and flavoring, a wineglass full with each meal.

This preparation of the salts of mother earth that belong in the blood has been used in my work for thirty years with great success, and the biochemist now says that this prescription contains a wealth of vitamines. Alternated with cod liver oil or red bone marrow, the genuine value of these foods is great in postoperative care.

In endeavoring to relieve chronic rhinopharyngitis and establish standards of treatment, it is interesting to remember that chronic hypertropic rhinitis, for example, and similar pathologic conditions are influenced in their development by the fact that man is now an artificial animal. Under the laws of conservation, why are the nasal passages, with their great importance to the preservation of health, so frequently deformed and hypertrophied? Is it not true that the causes of many of the surgical problems are etiologic factors that are evolutionary and devolutionary through many generations and ages? The shape of the head of the Caucasian varies at the present time decidedly from that of centuries ago. Anthropologists say that the relative proportion of the face and calvarium has undergone certain changes through the ages, until now the facial parts of our race are diminutive and compressed as compared with other parts of the body.

This change to artificiality is of course greatly reinforced by the relatively increased difficulty of parturition. It would seem logical to believe that prenatal as well as postnatal processes are increasing the necessity for operation on the nasal passages. It has been stated that more than 80 per cent bear the mark of an asystemic or abnormal developmental condition in the upper respiratory regions. Under these laws and those of heredity, physicians are called on to meet a progressive change in respect to the osseous framework of the face. This departure from the aboriginal type causes an increasing tendency to the hypertrophies of early life.

Neglected sinus infection has for many years been a constant source of chronic rhinopharyngitis, but my experience leads me to believe that the splendid instruction and excellent knowledge of the younger physicians will rapidly dispel any criticism along this line. The detection of sinus disease in infancy and childhood, owing to the investigation of

Dean and others, is rapidly diminishing the neglect of this etiologic factor. Our modern laboratory methods are extremely efficient in uncovering the syphilitic taint as a factor. A better control of nutrition in infancy is counteracting the lack of structural integrity that artificiality imposes.

As life advances pathologic conditions should decrease, influenced by the wonderful discoveries in immunization against the exanthems. It is not surprising that the delicate mucous membranes with their highly vascular and neural supply and the limited space in which they operate and develop should be influenced by climatic change.

Since it is the function of the turbinate bodies to become vascular and swell in order to protect the lower air passages from very cold air by the radiation of heat to the incoming current of air and by mechanically lining the lumen for the passage of the same, too much stress cannot be laid on the bad effects of exposure of the nasal passages to sudden extremes of cold and heat and variations in moisture. It is customary in this climate to subject this delicate mechanism to radical changes of temperature varying from dry heat at 80 F. to 40 F. or even below zero, thus straining the equalizing function of the vasomotor centers and destroying their necessary tone. These acts produce chronic hypertrophic change, frequently accompanied by infection. When the artificial environment and mode of life of the modern Caucasian are considered, it is not difficult to understand the profound influence these changes exert on the development of early pathologic conditions or physical defects. The balance between the physiologic and pathologic state is broken, in spite of the maintenance of nature's strong endocrine control over the vasomotor system.

COMMENT

Since occupations and habits predispose the individual to loss of vasomotor tone and to infection, it is scarcely possible to eradicate chronic rhinopharyngeal disease. The hope of amelioration lies in a brilliant scientific future in which the Caucasian child will be reared less artificially, with an opportunity to adjust his respiratory passages to natural climatic environments. Surgical methods for the relief of obstructive lesions will become more and more efficient and follow standardized rules of application.

It is my belief, however, that there will soon be an understanding of the laws of immunity and metabolism which will revolutionize many present methods of procedure. The untold prophylactic value of toxin-antitoxin for diphtheria, of antitoxin for scarlet fever, measles and tetanus, and of typhoid inoculation is already known. With proper immunization, with the maintenance of endocrine balance, with the restoration of proper facial development by scientific feeding, vitamine supply and outdoor life, the prospect for a healthy race is good. Meanwhile, otolaryngologic procedures will become progressively more useful.

INTRANASAL RADIUM THERAPY IN MALIGNANT AND BENIGN TUMORS

WITH CASE REPORTS

E. R. VAN METER, M.D.

ST. LOUIS

That the treatment of various intranasal pathologic conditions has been under discussion for many years is readily shown by a brief reference to medical history. As many as four thousand years ago, reference was made in medical history to definitely recognized nose and throat conditions. In reviewing articles by Hippocrates and Galen and those written during the Middle Ages, nose and throat conditions are mentioned repeatedly. Bruno of Longoburgo, who was born in southern Italy, educated at Salerno, and who taught at Padua about the middle of the thirteenth century, made a special study of the treatment of various intranasal pathologic conditions. He describes several varieties of nasal polyps and differentiates one of them as a "malignant tumor." This, he says was darker, of slight sensibility and was very hard. He advised against operation, as surgical intervention merely hastened its growth. With regard to the removal of the polyps, he quotes Abulcasin, the Moorish physician who lived during the second half of the tenth century and who suggested the removal of polyps by drawing them down with a hook, severing the connected portion with a knife and then shaving off any projection that may remain. The cautery was used to prevent recurrence. Hence, the study of the relief of this annoying condition is not a new one. More especially, the prevention of recurrence of nasal polyps has always been a question of deep concern to the rhinologist.

Although the subject has not been lost sight of in the intervening years, little advance has been made toward the successful treatment of these conditions. Recently many articles have appeared in medical literature showing a more concerted effort on the part of rhinologists to give this class of patients relief.

Gordon B. New of the Mayo Clinic, in a report of seventy-nine cases of malignant tumors of the nasopharynx, brings out three impressive facts:[1] (1) "That malignant tumors of the nasopharynx are much more common than has been believed; (2) that the syndrome which they present is not generally known, which accounts for many patients being treated medically and surgically without the discovery of the

1. New, Gordon B.: Syndrome of Malignant Tumors of Nasopharynx, J. A. M. A. **79**:10 (July) 1922.

tumor, and (3) there is a striking lack of nasal or nasopharyngeal symptoms in many of these cases."

Woltman,[2] in an article on malignant tumors of the nasopharynx with involvement of the nervous system, deals generously with this phase of the subject and includes among the early symptoms those of pain in the face or side of the head, headache, deafness, tinnitus, diplopia, blindness, proptosis, paresthesia of the face, cervical adenopathy, dysphagia, aphonia, hoarseness, and malignancy in remote parts of the body. The cranial nerves passing through the orbital fissures were usually involved extracranially, the one most commonly involved being the abducens nerve.

The same year, Horace R. Lyons,[3] in an article on radium treatment for nasal polyps, states: "The cause of nasal polyps is inflammation involving either the nasal mucous membrane, or an accessory nasal sinus, or both. Simply removing a polyp will not affect the underlying inflammatory process, which must be eradicated." He believes that the polyps should be removed, together with the underlying cause, so far as possible; that the application of radium should be started on the second or third day after operation; that radium should be applied not oftener than once a week; that 200 mg. hours, at weekly intervals is safe radiation as it has not produced a burn; that in the majority of cases radium undoubtedly definitely lengthens the intervals of recurrence, and that definite operative cures occur more often with than without radium.

Sluder,[4] in an article on the use of radium for nasal polyps, states in part: "The use of radium has, in the writer's experience, been a definite help in these cases. Gold tubes containing 12.5 mg. radium have been inserted into or among the polyps and allowed to remain three hours. This application has been repeated three or four times at intervals of one month, one tube in each nostril." He cites eight cases in which this treatment was satisfactory.

In a recent article, Robinson[5] states: "In twenty cases of polyps of the nose treated during the last six months, retardation of the growth and a longer freedom of recurrence has been noticed. However, the time interval is too short to permit the report of permanent results. Pre-existing infection accountable for the polypoid condition should certainly be given attention." His present treatment consists of the application of an adjustable lead applicator carrying 50 mg. of radium

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2. Woltman, H. W.: Malignant Tumors of the Nasopharynx with Involvement of the Nervous System, Arch. Neurol. & Psychiat. **8**:412 (Oct.) 1922.

3. Lyons, Horace R.: The Treatment by Radium for Nasal Polyps, Amer. J. Roentgenol. **9**:584 (Sept.) 1922.

4. Sluder, Greenfield: Use of Radium for Nasal Polyps, Laryngoscope **34**:124 (Feb.) 1924.

5. Robinson, G. Allen: Radium Treatment of Neoplasms of the Upper Air Passages, J. A. M. A. **84**:248 (Jan.) 1925.

for from one to three hours. For malignant neoplasms of the nose and accessory sinuses, he advises a combined radium and surgical treatment.

In the fall of 1921, I became interested in radium therapy intranasally for cases of recurrent polyps. In my first cases I used only small doses. A silver tube containing 25 mg. was inserted into the midst of polyps, as close to their point of origin as possible, and allowed to remain for one hour. This was not followed by any apparent reaction, and clinically, the growth was not affected. The dose was gradually increased until it was found that 50 mg. of radium could be used for two hours without causing discomfort or reaction within the nose. I then decided to treat the patient surgically and to apply radium later. On Sept. 25, 1921, I removed an enormous polyp, which had its origin from, or in the region of, the postethmoids. This was the third time this growth had been removed in three years. I waited for two weeks, and on October 8, applied 50 mg. of radium for one hour and fifty minutes. The growth has not recurred. This technic was followed in several cases without uniformly good results. I gradually increased the doses to 300 mg. hours. This dose has been used repeatedly without producing undue reaction or burns, and one application, thirty days after operation, has given uniformly gratifying results.

In malignant tumors of the nasopharynx, it is necessary to use a much larger dosage. I have used as much as 900 mg. hours' radiation in the postnasal space in a case of nasopharyngeal carcinoma. But so far in my personal experience with this type of case, in all instances but one, the patients were seen so late that metastases had occurred, and, although the symptoms were greatly relieved by radium, the end-results have been anything but gratifying. I shall report one case in detail.

REPORT OF CASES

Case 1.—A young man, aged 19, who was referred to me on June 9, 1924. He had a severe headache extending from the left frontal region back over the parietal and down over the occipital region and back of the ear. He had a total paralysis of the third and sixth cranial nerves on the left side. He was sent to the hospital for a complete general examination. His blood and spinal fluid Wassermann tests, as well as all other laboratory tests, were negative. The left cheek was somewhat more prominent than the right, but his sister stated that this condition had existed since childhood. The report of the x-ray examination showed a slight relative haziness of the left ethmoid group and the left maxillary antrum, but this was not definite enough for a diagnosis of infection. On postnasal examination, I was able to make out a small roughened, slightly elevated mass in Rosenmueller's fossa. It was too small for me to get a satisfactory specimen for laboratory diagnosis; but by the process of elimination and on the subjective and objective evidence, I made a clinical diagnosis of malignancy. I inserted 50 mg. of radium in a silver tube into the postnasal space in direct contact with the mass and gave a total of 350 mg. hours' of radiation. On the fourth day after the application, the ptosis began to clear up, and the pain became less. On the seventh day, the patient's eye was wide open, and he had a fairly good movement of the eyeball in every

direction. The pain had disappeared. His external rectus remained sluggish, and he had some double vision for several weeks; but the pain or the paresis has not recurred, although he had had several severe attacks of acute rhinitis with marked swelling of the entire nasal mucosa during the past months. I have kept this case under observation, and so far there has not been a recurrence of the growth.

I shall report a similar case but of much longer standing, the comparison demonstrating clearly the necessity for careful and thorough examination in this type of case and for early diagnosis and treatment.

CASE 2.—*History.*—J. M. was admitted to Barnes Hospital, Jan. 29, 1923, with a tentative diagnosis of tumor of the cerebellar pontine angle (left). His chief complaints were headache, double vision and impaired hearing. Family history and present history were unimportant. The present condition began four years ago with blurring of vision corrected by glasses. Three years before the patient consulted me, hearing diminished in the left ear, accompanied by tinnitus and pain; this lasted two years. Two years ago the patient began to have occipital headaches and a continuous dull aching pain extending down the neck. During the last year the headache became much worse and continued to the left side, extending from the forehead to the occiput. The patient thought that there had been some memory defect during the last two years. He had had dizzy spells daily for the last six months and he had fallen backward once. For six weeks he had had double vision.

Physical Examination.—Examination revealed: Head tilted to the left, slight edema of the left disk, ptosis of the left upper lid, paresis of the left external rectus, heard watch at a distance not greater than one-half inch with left ear. Air conduction diminished on the left, slight conjunctivitis and photophobia and slight but definite adiadokokinesis on the left. The routine laboratory examinations showed negative results. Spinal puncture was negative; the blood and spinal fluid Wassermann tests were negative. Air was injected without results.

The patient was discharged from the hospital on Feb. 17, 1923.

Second Admission and Treatment.—He was referred to me for nose and throat examination on Feb. 20, 1923. A posterior rhinoscopy showed a tumor mass of irregular shape occupying practically the entire left choana. Palpation with a probe and later with the finger showed it to be hard and indurated and to bleed freely and easily. The patient was readmitted to the hospital on February 28, and a specimen the size of a small hickory nut was removed with the snare and sent to the pathologic laboratory for diagnosis. The pathologic diagnosis was carcinoma. On March 14, 75 mg. of radium were placed in direct contact with the tumor mass, and a total radiation of 250 mg. hours was given without immediate reaction. The patient was discharged from the hospital on the following day.

When an observation was made on March 28 he had less headache, the eye condition was improving and the patient said that he had gained several pounds in weight. Locally, the mass was smaller and smoother in appearance. By this time I was able to see between the mass and the septum.

When a second observation was made on April 4, the patient showed a decided improvement. Double vision was still present but there was less ptosis and the pain was felt only at intervals of four or five hours and lasted only a few minutes at a time.

On May 2 the mass could not be seen. Eye symptoms were greatly improved and he had only occasional headaches.

On May 22, ptosis and photophobia were greatly improved, but locally the condition was the same.

The patient gained greatly in weight, his general physical improvement was very marked, and he was able to secure a position as railroad watchman. In June, 1924, he was brought into a local hospital in a state of coma, and died in about twenty-four hours. When last seen by me, the growth was not evident postnasally, but it had evidently extended upward, involving the meninges and causing death.

CONCLUSIONS

I have made observations on only ten cases of this type, that is, malignancies originating in the nasopharynx. From my observations on this limited number of cases, and from the experiences and observations of other writers on this subject, I have drawn the following conclusions:

1. Malignancies occurring in the nose or nasopharynx are far more frequent than even the most conservative believe.

2. More careful study by the rhinologist of this type of case, especially of the nasopharyngeal space, should be made.

3. In certain malignancies, when diagnosis is made early, radium offers greater possibilities as a therapeutic agent than any other known remedy.

4. In persistent, recurrent cases of nasal polyps, the combined surgical and radium treatment is to be preferred, and a certain number of these patients will get well under this treatment.

5. Larger doses of radium should be used, and the radium should be administered in one dose rather than in divided doses.

6. Radium should not be used until four weeks after operation.

CHRONIC OTITIS MEDIA

COMPLICATED BY CHOLESTEATOMA, LABYRINTHITIS AND SUPPURATIVE MENINGITIS, WITH RECOVERY

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DETROIT

Intracranial involvement, complicating otitis media, is especially likely to prove fatal to patients who have a turbid spinal fluid, papilledema or definite bradycardia. Karbowski [1] refers to seventeen cases of meningitis of otitic origin; of these, four patients who had a clear spinal fluid recovered, while all but one of the thirteen who had a cloudy fluid died. Papilledema occurs in about 44 per cent of patients with an otitic meningitis; in White's [2] experience this indicated a fatal prognosis. Likewise complication with bradycardia gives a bad prognosis.[3]

Otitic meningitis, a bacterial meningitis with a cloudy spinal fluid, is described by Wharry,[4] who called it meningitis maligna; he states that only 2 or 3 per cent of these patients have been known to recover, and that the disease in those who recovered was of a staphylococcic origin. The patient whose case I report recovered, although most of the signs forecast a fatal termination.

REPORT OF A CASE

History.—J. W., a man, aged 37, one week before entrance into the hospital attempted to cleanse the left ear with a match. A short time later, he was affected with dizziness and was unable to attend to his work. There was a slight discharge from the left ear.

On Sept. 7, 1926, he was admitted to the hospital complaining of dizziness and vomiting. His temperature was 99.6, pulse rate 78. He had had a chronically discharging ear since childhood. The present illness began ten days before admission, with headache, dizziness and discharge from the left ear. He vomited during the first day in the hospital. On the third day in the hospital, headache and dizziness continued. His temperature was 99, the pulse rate 58. There was moderately profuse, pulsating, purulent and fetid secretion in the left auditory canal. A large polyp, attached above, nearly filled the canal. There were granulations deeper in the canal. There was no tenderness over the mastoid region, the left mastoid tip was less defined than the right.

Neither the whispered nor the spoken word could be heard. Stenger's *a'* (435) fork was not heard. The fistula-symptom test was negative. There was a second degree horizontal rotary nystagmus to the right; when he moved his head,

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1. Karbowski, B.: Acta oto-laryng. **7**:356, 1925.

2. White, Leon E.: Papilledema of Otitic Origin, Arch. Otolaryng. **4**:373 (Oct.) 1925.

3. Lund, quoted by Eagleton, Wells P.: Intradural Complications of Nasal and Aural Origin, Arch. Otolaryng. **4**:69 (July) 1926.

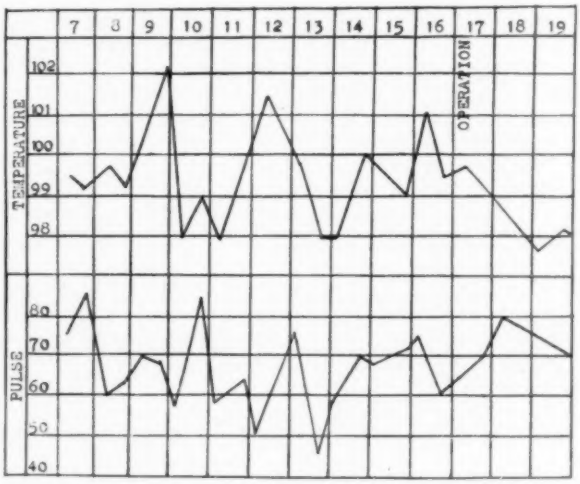
4. Wharry, H. M.: Three Cases of Middle Ear Disease with Intracranial Complications, Brit. M. J. **1**:85, 1926.

a slightly more vigorous nystagmus to the right resulted. Reaction did not occur when a caloric test with 500 cc. of cold water was made.

There was marked tenderness on pressure of the eyes; there were no changes in the fundus. Paralysis of the cranial nerves did not occur; there was some stiffness of the neck and pain. Incoordination in the hands and spontaneous past-pointing were absent. Abdominal and cremasteric reflexes were present; dermographia was noted. The spleen was not enlarged. The reflexes were exaggerated; the Kernig, Babinski, Oppenheim, Gordon and Chaddock signs were absent.

The right ear was normal. Roentgen-ray examination of the left ear revealed a second degree destruction of the mastoid cells. Spinal puncture disclosed a cloudy fluid under increased pressure; 35 cc. were withdrawn. There were 1,500 cells. The spinal fluid contained a gram-negative bacillus, a pneumobacillus (Dr. J. E. Davis).

September 13: The general condition was improved; he had less headache and less vertigo, and the neck was not so stiff. Tenderness of the orbits persisted. The patient did not show aphasia; he was perfectly oriented. The



Pulse rate and temperature curve of author's patient.

temperature was 100 F.; the pulse rate 74; the tongue was moist. He had only a first degree rotary nystagmus to the right with some giddiness when looking in this direction.

September 14: The fetid aural discharge continued. There was a marked drop in temperature after the spinal drainage was made; the pulse was still relatively slow. Nystagmus was still present; past-pointing, adiadokokinesis, and incoordination in the hands and feet were absent. Spinal puncture revealed 8 cc. of cloudy fluid under pressure; culture of the fluid disclosed the same organism, the pneumobacillus of Friedländer.

September 16: The patient was restless during the night, complaining of headache and stiff neck. The temperature was 101 F., the pulse rate 74. He did not have chills.

There was only an occasional rolling movement of the eyes when looking to the extreme right. He was totally deaf; there was no reaction to cold when caloric tests were made. The knee reflexes were exaggerated; the Kernig and Babinski signs were negative. The labyrinthitis was subsiding; the intracranial condition appeared to be progressing; hence operative intervention was decided on.

Operation.—On September 17 a radical mastoidectomy was performed; a sclerotic mastoid process, cholesteatoma in the attic, polyps and granulations in the middle ear cavity were found. Considerable bleeding occurred from a very large emissary vein. The prominence of the horizontal canal had an eroded area with a 4 mm. deep, old (black) fistula adjoining the path of the facial nerve. The middle fossa, the lateral sinus and the posterior fossa were exposed, and the dura was found to be normal in appearance; there was a moderate increase in pressure of the posterior fossa. Labyrinthectomy was performed according to the method of Hinsberg: injury to the sinus petrosus, control of bleeding by pressure. A plastic operation was performed on the auricle. Iodoform tampons were placed in the external canal; one tampon was directed toward the middle and another toward the posterior fossa in the postauricular wound. Spinal puncture was performed, and 5 cc. of cloudy fluid drained.

The postoperative condition was good. There was some oozing of blood through the dressing; hemostatic serum was administered. Three hours after operation, left facial paralysis ensued.

September 18: The temperature was normal, the pulse rate 80 and the beat was forceful. A mixed vaccine containing the bacillus of Friedländer was given subcutaneously in increasing doses every second day.

September 20: Gradual improvement occurred in the general condition; the headaches had disappeared, the temperature was normal, the pulse rate varied between 78 and 82 and the beat was forceful. Nystagmus and dizziness had disappeared. Spinal puncture resulted in 10 cc. of only slightly cloudy fluid. The first dressing was applied; all tampons were renewed, dry. An eyepatch was used to protect the left cornea.

September 21: The second dressing was applied; there was some purulent exudate in the wound, denoting a "healthier" appearance. Temperature and pulse were normal. Spinal puncture was made, and 8 cc. of slightly turbid fluid was removed into two sterile test tubes. The cell count in the first tube was 500; there was no fibrin, and bacterial growth did not occur in the culture. The second tube had a count of 520 cells; there was no fibrin and culture was negative. The cell count had, therefore, markedly decreased, and the spinal fluid was sterile.

September 23: The iodoform tampons were changed daily; the postauricular wound was draining freely. The temperature was normal; the pulse was not so forceful.

September 25: The patient walked to the toilet when he was unobserved by the nurse.

September 30: Spinal puncture was performed; 5 cc. of clear fluid under normal pressure was obtained. The cell count was 162; culture was negative.

October 6: The patient was allowed to be up.

October 14. The temperature and pulse were normal. The use of vaccine was discontinued. Faradic and galvanic currents were applied to the left side of the face daily.

December 22: The general physical condition had improved considerably, the patient had gained about 15 pounds (7 Kg.). The left ear was, of course, totally deaf. Facial paralysis persisted.

SUMMARY

The first otologic examination of this patient disclosed that an acute exacerbation of a chronic otitis media existed. The discharge was purulent and fetid; there was apparently a total deafness of the left ear with no labyrinthine reaction to calorization. A spontaneous, vestibular nys-

tagmus was observed, and there were signs of meningeal irritation. The objective picture of the ear suppuration demanded a radical mastoidectomy and exposure of the middle and posterior cranial fossae.

The vestibular nystagmus, the dizziness and vomiting pointed to a labyrinthitis; whether it was a diffuse, purulent labyrinthitis or a serous labyrinthitis remained undecided. In the former instance, immediate operative intervention would also necessitate the performance of labyrinthectomy; in the latter, operation could be delayed unless the intracranial symptoms became more pronounced.

Subjectively, the patient was improved after the massive spinal drainage, but only temporarily. Recurrence of the severe occipital headaches, stiffness of the neck and the establishment of the presence of micro-organisms in the fluid were definite indications for mastoidectomy. The intensity of the nystagmus diminished; total deafness and a nonirritable labyrinth existed; that is, a dead labyrinth, hence the labyrinthectomy.

The postoperative recovery of the patient was remarkably rapid. Headaches, dizziness and fever disappeared on the second day after operation. The spinal fluid on the fourth day was sterile, and the leukocyte count dropped to a third of that prior to operation. The pulse now gradually became normal in rate and volume.

This patient, therefore, had a localized, bacterial meningitis of the posterior cranial fossa healed by operative exposure of the dura of the middle and posterior cranial fossae and eradication of the seat of primary infection—the middle ear and the labyrinth. The extraordinarily rapid recovery was enhanced by operative relief of the intracranial pressure and drainage by means of repeated spinal punctures.

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ENDOTHELIOMA OF THE NOSE

REMOVAL THROUGH POSTERIOR WALL OF ANTRUM FOLLOWING RADICAL ANTRUM OPERATION *

HAROLD A. FLETCHER, M.D.

SAN FRANCISCO

The history of the diagnosis in the following case is of interest.

REPORT OF A CASE

History.—A man, aged 52, when first seen on Sept. 11, 1925, complained of stuffiness in the ears, particularly in the left, following a cold in the head. The symptoms were those of an acute catarrh of the eustachian tubes, more marked on the left side. The contributory causes were a recent cold in the head and congested membranes of the nose. His tonsils had been removed previously.

Treatment.—Treatment by mild inflation of the ears and treatment of the nose cleared up the condition in the right ear, but the hearing in the left ear remained impaired and the drum remained slightly congested. There was a definite congestion of the left tube on catheterization. On October 19, five hours after the use of the eustachian catheter, the patient suddenly became dizzy and nauseated and had an attack simulating a Ménière symptom complex, during which he remained in bed for several days. The left ear became practically deaf at the onset of this attack, but after treatment the hearing returned to a certain extent.

Until this time the only pathologic feature was a slight prominence of the anterior lip of the opening of the eustachian tube. It appeared slightly edematous, with a constant hypertrophic swelling of the posterior tip of the left lower turbinate. Two small tabs which looked like the remains of adenoid tissue appeared at the top of the left posterior choana. On November 11 I noted that when this region was touched with an applicator there was a tendency to bleed, and the swelling of the anterior half of the opening of the eustachian tube appeared slightly increased. The tabs, which bled easily, were removed and sent to a pathologist to be sectioned. The pathologic report was "Mucous polyp with no evidence of malignancy." The Wassermann reaction was negative. Results of the blood count and urinalysis were also negative.

The patient was kept under observation until the middle of January, 1926. Further symptoms did not appear, but the slightly edematous condition of the anterior border of the left tube and slight contraction of the upper lateral arch of the left choana remained. I still thought that the condition might be malignant.

Biopsy and Stereoscopic Examination of Tumor.—On Jan. 20, 1926, an extensive examination with the nasopharyngoscope, pharyngeal mirrors and palate retractors resulted in the same observations as previous examinations; in addition, the posterior part of the left lower turbinate filled the whole lower part of the nose in this area. I removed the posterior tip under local anesthesia. Except for a small polyp on its under surface, it looked like a chronically hypertrophied turbinate. However, I sent the whole piece of the turbinate to the pathologic laboratory of Stanford University for sections, in order to convince myself that the condition was not malignant. I did not receive a report until the middle of February. The microscopic pathologic diagnosis made by

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* Read and case presented before San Francisco County Medical Society, Nov. 23, 1926.

Dr. F. E. Blaisdell was endothelioma and it was confirmed by Dr. William Ophüls. The turbinate had healed, except in one small spot on the under surface of the posterior part which showed a tendency to bleed when touched.

I had stereoscopic roentgenograms made. The report read, "Slight increased density of frontals and right ethmoids. No evidence of bony erosion." I was not satisfied with this study, and I sent the patient to Stanford University Hospital Surgical Laboratory, where Dr. Edward Chamberlain and Dr. Robert Newell made another study. Lateral stereoscopic plates (which had not been made by the other laboratory), when put on the viewing box of the stereoscope, showed definite destruction of the bone of the posterior wall of the left maxilla and partial destruction of the greater wing of the sphenoid. In other words, the growth was in the pterygopalatine fossa. The value of these pictures depends entirely on the stereoscopic comparison of the two sides. They are positive in that on one side the normal structures and bony contours appear and on the other they do not.

I had known that the tumor was inside the nasal cavity, as it encroached on the lower turbinate, and now I had evidence that it extended outside the nose behind the maxillary sinus. The reason for the occlusion of the eustachian tube and the pathologic condition in the ear was clear, since a tumor in the pterygopalatine fossa would press on the tube from the outside.

I heard Dr. Sewall read his paper on "An Operation for the Removal of the Spheno-Palatine Ganglion."[1] I thought that this tumor might be removed by getting around, behind and lateral to it through the posterior wall of the antrum and continuing a radical antrum operation as Dr. Sewall mentioned in his suggested route for uncovering the sphenopalatine ganglion in the upper apex of the pterygopalatine fossa. I had performed this operation several times on the cadaver, and felt it could be accomplished.

I then had a consultation with Dr. Sewall and Dr. Wallace Smith. They agreed with the diagnosis and felt that the proposed plan of attack was best. Dr. Sewall felt that a local anesthetic would be preferable because bleeding could be better controlled.

Operation and Course.—On March 4, 1926, the patient was given morphine sulphate, ¼ grain (0.016 Gm.); scopolamine, 1/150 grain (0.0004 Gm.) three-quarters of an hour before the operation. Local injections were made as for a radical antrum operation. The antrum was opened. There was some polypoidal degeneration of the membranes of the antrum, particularly in the roof.

The posterior bony wall of the antrum was taken away. The bony structure in places was as thin as parchment, or absent (pressure absorption). Before removing it, procaine hydrochloride was injected through it into the pterygopalatine fossa around the sphenopalatine ganglion. Before the periosteum of the posterior surface of the back wall of the antrum was opened, the contents of the pterygopalatine fossa seemed under definite tension, and tended to bulge into the antrum. Whether this is a natural condition or partly due to the pressure of the tumor, I do not know. It is not present in operations on the cadaver.

The next step was to incise the periosteum separating the fossa from the antrum and then to isolate and tie off the sphenopalatine vessels lateral to the tumor. There was little bleeding from this, although the ligature was later removed in taking out some tissue in this area. The fact that dissection is easier on a cadaver than on the living is nowhere better exemplified than in this area, although I believe the pressure of the tumor was the cause of part of the difficulty.

I removed the medial wall of the nose posterior to the anterior third of the lower turbinate and medial to a plane through the infra-orbital notch, ethmoids, sphenoids, turbinates, vertical plate of the palate bone, pterygoid processes, part of the internal pterygoid muscle and part of the eustachian tube. It was impossible

1. Sewall, E. C.: An Operation for the Removal of the Sphenopalatine Ganglion," Ann. Otol., Rhin. & Laryng. **35**:1-22 (March) 1926.

to delimit the boundaries of the tumor beforehand, but everything that appeared to be involved in the pathologic process was removed. The ascending plate of the palatine bone and the internal pterygoid plates were definitely involved. The wound was packed with petrolatum gauze, so that it could be removed through the nose and the incision in the alveolar process closed.

The procedure took about five hours. Toward the last there was much pain, mostly from the anterior ethmoid nerve branches, which should have been blocked by injection as in operations on the frontal nerve.

There was surprisingly little reaction from the operation. Part of the packing was removed in twenty-four hours and the rest in forty-eight hours.

On March 13, nine days after the operation, two 50-mg. tubes of radium were placed in the cavity for twenty-four hours. The reaction from this, although causing discomfort in the left side of the soft palate and nasopharynx, was not as severe as I expected.

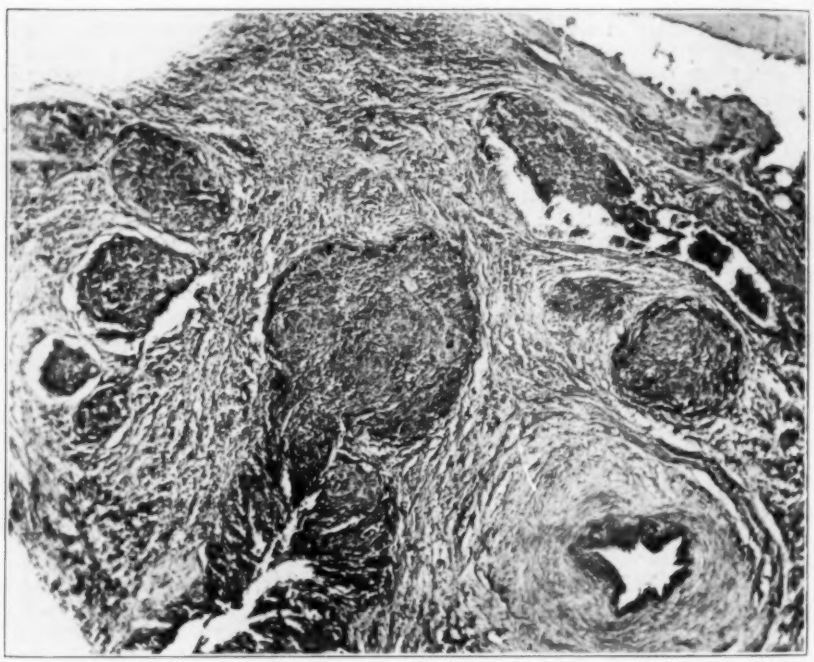

Fig. 1.—Endothelioma showing vessels filled with proliferating endothelial cells. X 70.

After that reaction wore off, the wound healed satisfactorily. The back part of the nose and cavity have filled in and are covered by a dry, shiny, pseudo-mucous membrane. A little granulation tissue remains in the region of the posterior ethmoids, fairly high up. Specimens of this were examined microscopically on October 15, and were reported to be "granulation tissue—no evidence of malignancy." There has not been any evidence of recurrence.

Stereoscopic examination was made on October 18, for comparison with the former plates. The report by Dr. Newell was as follows: "The left maxillary is gray, apparently pretty well filled with probably soft tissue. The bones of the left side show operative defects but the bony surfaces are hard and sharp without any suggestion of infiltration." This is the usual picture following a radical antrum operation.

COMMENT

A word about endothelioma. It is a malignant growth, starting, as its name implies, from the lining cells of the blood vessels, gradually filling the lumen and breaking through into the surrounding tissue. In the region of the nose it is likely to reach the brain by gradual extension rather than by metastasis. Although definitely a malignant growth, it is usually slow growing, and, as a rule, it does not metastasize early. Two photomicrographs of the tumor are presented in figures 1 and 2.

The sections and photomicrographs were made by Dr. F. E. Blaisdell of the Stanford University Hospital Surgical Laboratory.

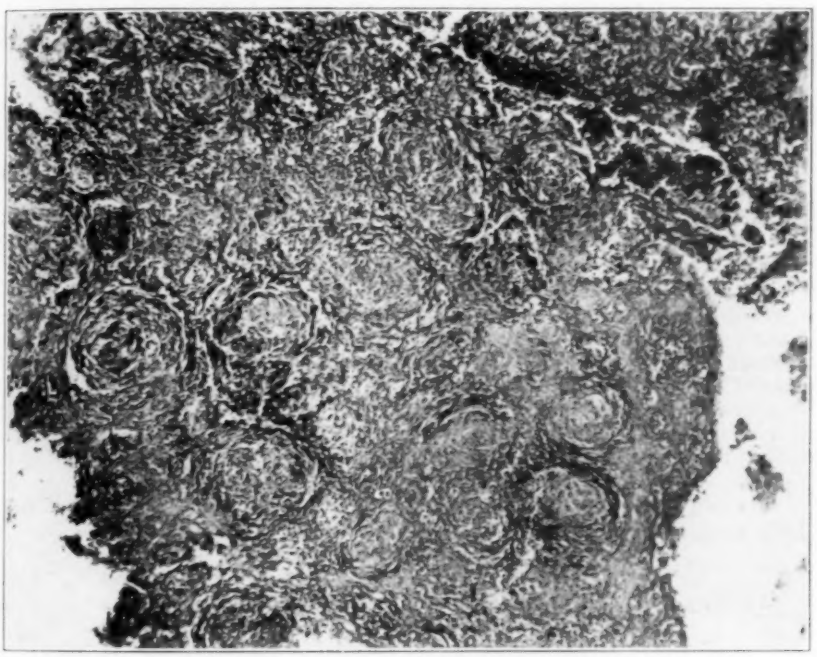

Fig. 2.—Endothelioma showing endothelial whorls. X 115.

As far as I know, this is the first time that this operation has been performed, as Dr. Sewall said he had done it only on a cadaver. From my experience with this case, I feel that for certain pathologic conditions encroaching on the pterygopalatine fossa, particularly the removal of tumors or malignant growths in the back part of the nose, this procedure will become generally used. It is a definite advance in the surgical technic of the rhinologist. Even though a malignant growth may not be removed entirely from this region, the exposure gained gives better access to other aids, such as surgical diathermy, fulguration and radium, than the usual nasal openings.

490 Post Street.

DIAGNOSTIC ESOPHAGOSCOPY IN ULCERATIONS

REPORT OF CASES *

RICHMOND McKINNEY, M.D.
MEMPHIS, TENN.

The esophagus as seen through the esophagoscope is still somewhat of a terra incognita to me, and even the experience of constant application of this method of diagnosis over a number of years fails to relieve me of the feeling that the advantage of direct vision does not invariably insure exactitude in diagnosis; however, it is the most definite means of determining the character of esophageal lesions. In the following cases esophagoscopy aided materially in making the diagnosis.

REPORT OF CASES

CASE 1.—A woman, aged 35, had swallowed a plum seed about three weeks before she consulted me. During this time, she had suffered intensely with a sensation of something in the esophagus. She referred most of her suffering to the thyroid region, pressure on either of the thyroid lobes eliciting an expression of intense pain. The thyroid gland was swollen. The blood Wassermann was negative.

Fluoroscopy and roentgenograms did not reveal a foreign body. On esophagoscopy, an ulcerated area, about 1.5 to 2 cc. in diameter, and covered with mucopus, was found a third of the way down the esophagus. The ulceration was not deep, and the edges were not sharply defined.

After cleansing the surface of the ulcer, a solution of silver nitrate, 10 per cent, was applied. Two subsequent applications, at intervals of several days, brought about healing of the ulcer, with subsidence of the thyroiditis.

The only conclusion at which I could arrive in this case was that the plum seed had abraded the mucosa of the esophagus on its passage to the stomach, with resulting infection, and that the thyroiditis came from this.

CASE 2.—A man, aged 23, came to my service at the Methodist Hospital, with a history of gradually developing difficulty in deglutition. The day before admission to the hospital his esophagus seemed to close entirely, even water being regurgitated. He complained of a severe pain in the cardiac region, especially on ingestion of food. Usually after the food passed into his stomach, the pain was relieved. He had been losing weight steadily for some time. Recently he had been having pain in the left side of his chest. There was a leukocyte count of 13,600. The blood Wassermann reaction and Kahn's precipitation test were negative.

The roentgenologist's report on Jan. 20, 1926, was: "the apices appeared clear and lighted up normally on forced inspiration. The left side of the diaphragm moved normally, and the left costophrenic sinus was clear. The lung field of the left side presented normal brilliance. The posterior mediastinum appeared obliterated in its lower portion. The hilum shadows were

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* Read before the American Laryngological Association, forty-eighth Annual Congress, Montreal, Canada, June 3, 4 and 5, 1926.

increased in size and density, especially on the right side, and extending out into the right lung field from the right hilum to the periphery was a more or less mottled, dense area. Extending downward and outward from the right hilum was another more homogeneous, dense shadow obscuring the right side of the diaphragm, and obliterating the right costophrenic sinus. Through this density the right side of the heart could be seen faintly, and the heart appeared displaced slightly to the right. The aforementioned dullness did not pulsate and did not change shape or position with the alteration of the patient's position. The barium passed down the esophagus to the level of the third rib anteriorly, where it was stopped. The lower extremity of this portion of the esophagus was funnel-shaped, but rather rough and somewhat eroded in appear-

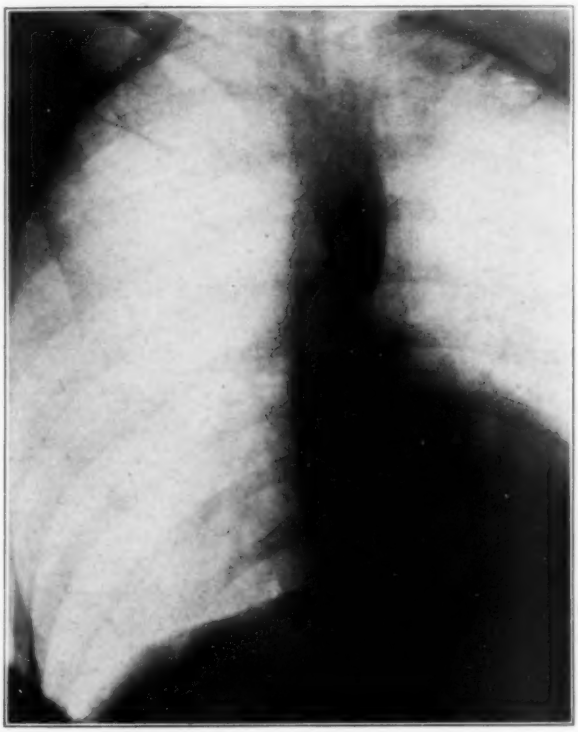

Fig. 1 (case 2).—Roentgenogram taken on admission to hospital. The condition resembles phrenospasm.

ance. On the left side there was an area with the appearance of external pressure. There was a slight amount of the barium seen below the obstructed point. The diagnosis was: Obstruction of the esophagus at the level of the third rib anteriorly, probably caused by malignancy, with metastasis into the lungs.

I advised an immediate gastrostomy, which was performed. Two days later, the patient's chest, including both lungs, was aspirated under the fluoroscope, but only blood was withdrawn. Culture of this was negative.

Five days after the gastrostomy I performed an esophagoscopy, with local anesthesia. I used a 7 mm. esophagoscope without difficulty, until about half way down the esophagus, when a decided constriction was encountered. This

was not smooth in contour, but appeared to be irregular, as though there were some infiltration. I gradually worked the esophagoscope through this constricted area, passing it to the stomach before withdrawing it.

Feeding was now begun by mouth, and the patient could swallow somewhat better. Deep roentgen-ray therapy of the chest was also instituted. After a few days he returned to his home in the country. About six weeks later he again came to the hospital saying that he was losing weight and strength. Cachexia was marked. Esophagoscopy at this time revealed a somewhat altered picture. The tube could not be passed through the stricture and the walls of

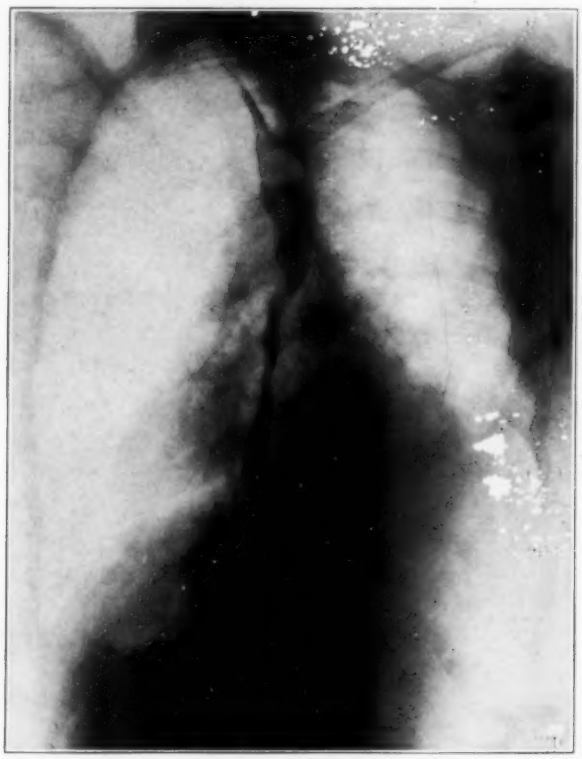

Fig. 2 (case 2).—Roentgenogram taken later, showing irregular constriction of esophagus, apparently with areas of infiltration.

the esophagus were unyielding and bled on touch. Another roentgenographic study of the chest and esophagus was made by another roentgenologist. The report was: Roentgenogram of chest shows right lower two thirds of chest solid density. Looks like encapsulated fluid.

In a review of the former roentgen-ray examination of the mediastinum and esophagus, a ragged, irregular, obstructive filling defect was found in the esophagus at the level of third rib, just below the aortic arch. This defect had every probable appearance of organic stricture, as it did not simulate a cardiospasm. The mediastinum was clear. The lower part of the chest on the right side was of solid density, both angles of the diaphragm being obliterated.

The diagnosis was: stricture of the esophagus, organic in nature, but not definitely malignant; pleurisy with effusion of the right lower lobe, more probable than a new growth.

The patient died on May 25. Autospy was unobtainable. Several days before he died, pyloric stenosis developed, and anything put into his stomach was regurgitated through the gastric fistula. Evidently metastasis had closed the pyloric opening.

CASE 3.—A man, aged 58, seen by me at the Memphis General Hospital, had been having difficulty in deglutition for two months. He had been in good health previously, weighing normally 150 pounds (68 Kg); he now weighed 110 pounds (49.9 Kg.). He vomited everything he ate. He drank water with difficulty, and only a tablespoonful at a time. There was considerable pain in the epigastrium. The blood Wassermann test was positive. Fluoroscopy showed a stricture at the cardia, with apparent infiltration anteriorly.

On esophagoscopy, marked constriction was found at the cardia. The anterior wall of the esophagus at this locality was thickened, with a roughened surface, which apparently was ulcerated.

Five days after this examination, the man suddenly developed symptoms of collapse. The pulse rate became rapid and weak, and his face had an ashy color. A large amount of coffee-ground liquid was vomited the morning of this day, and at 11 o'clock of the same day he died.

Autopsy showed that 3 cm. above the cardia there was considerable thickening of the esophageal wall, with an irregular perforation at the upper edge. Straddling the pyloric ring and involving the stomach and duodenum, an ulcerative process was found, consisting of two or more pockets extending through the wall of the stomach and duodenum, with their bases in a bluish-white tissue mass. Sections of the esophagus from the area of perforation and of the pyloric region showed, principally in the muscle layers, epitheloid and lymphoid cells and absence of surface epithelium.

The pathologist reported syphilitic ulceration of the cardiac end of the esophagus and of the pylorus.

A gastrostomy should have been performed when this man was first admitted to the hospital. His life might have been saved; in any event, it could have been prolonged, and his last days could have been made more comfortable. With nourishment through a gastric fistula and intensive antisyphilitic treatment, it is possible that great relief could have been obtained. He had received one dose of arsphenamine when I first saw him, but a gastrostomy, for the purpose of nourishment and relieving the esophagus, should have been performed when he first entered the hospital.

CASE 4.—A man, aged 55, began to have slight pain in midline of the abdomen, just below the ribs, about five or six months before I saw him. When seen by the internist, who referred him to me for esophagoscopy, he had been on the Sippy treatment for three months, but the pain was growing worse constantly. It was much more severe on taking food, and even when the patient swallowed when not eating, the pain was intense. When food was taken, the pain spread over the left side, just below the heart, and to the corresponding axilla. He complained that his back hurt so that even a shirt was uncomfortable. He did not have hemorrhages, was not nauseated and did not vomit. The spinal fluid and blood Wassermann tests were negative. There was great loss of weight during the period of illness.

Fluoroscopy the day before I was asked to examine this man showed only slight retardation in the progress of the barium milk, just above the cardia.

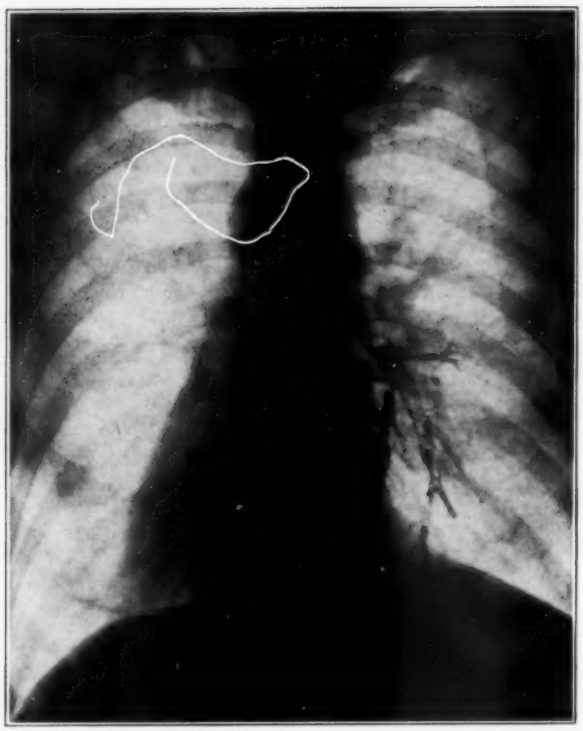

Fig. 3 (case 4).—Barium filled bronchial tree.

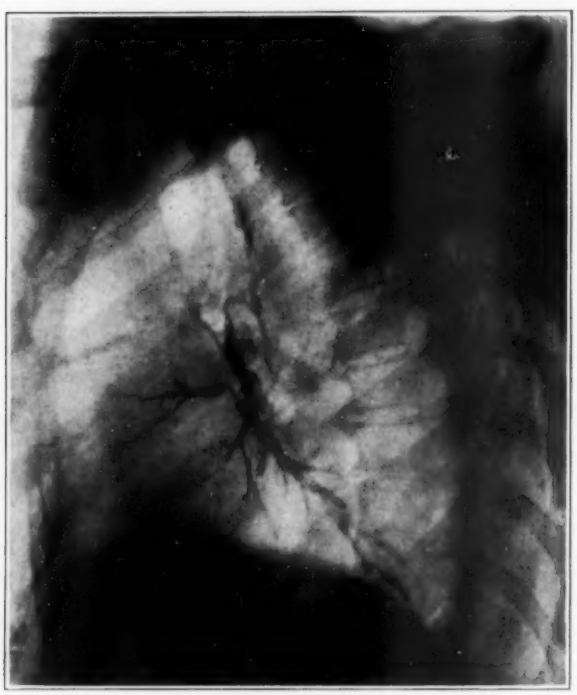

Fig. 4 (case 4).—Another view of the barium filled bronchial tree.

When the patient was brought to the operating room for esophagoscopy, the slightest bodily movement made him writhe in agony. I had never before seen an esophageal lesion cause such suffering.

The hypopharynx and esophagus were anesthetized with 10 per cent cocaine solution before the esophagoscope was passed. It was not difficult to introduce the tube. I found that the anterior wall of the esophagus, several centimeters above the cardia, was thickened, with some budding from the wall, and that there was a slight tendency to bleed when it was touched. Further procedures were not attempted, as there appeared to be a malignant condition. I advised gastrostomy.

Four days subsequent to this examination, the patient again consulted the internist who had referred him to me. He said that following the esophagoscopic examination he had had great relief from his pain until that day, but that now he was suffering much more than previously. Gastrostomy had not been performed.

The roentgenograms show the condition that the fluoroscopy revealed. A barium filled bronchial tree is seen almost in its entirety. The ulcer had perforated the esophagus into the trachea. (figs. 3 and 4).

A gastrostomy was performed, but the patient died forty-eight hours later.

The last two of these cases emphasize the necessity and prime importance of an early gastrostomy in all conditions when apparently there is an esophageal ulceration or infiltration. By this means the patient may be nourished adequately, the esophagus placed at rest and the sometimes distressing pain relieved. A gastrostomy is a comparatively simple surgical procedure; it can be performed in most cases under local anesthesia, and it is of inestimable value in these cases.

STUDIES OF FUSIFORM BACILLI AND SPIROCHETES

NO. XIII. FUSOSPIROCHETAL ABSCESS OF THE TONSIL

I. PILOT, M.D.

From the Department of Pathology and Bacteriology, University of Illinois, College of Medicine

CHICAGO

In the consideration of tonsillar infections caused by *Bacillus fusiformis* and Vincent's spirochetes, the common condition is acute angina. These organisms can readily be demonstrated in large numbers in smears made from the membrane. Granular actinomyces-like masses made up largely of these organisms are harbored in the tonsils of a large number of persons (30 per cent).[1] The presence of these granules excites little or no cellular reaction. A chronic inflammation may exist if the granules distend the crypts (Davis). In cultures the bacilli occur in 82 per cent of tonsils which do not present any distinct changes with the exception of hypertrophy.[2] In the routine examination of many hundreds of tonsils, chronic abscesses were often encountered, but in only three instances were the lesions associated with both fusiform bacilli and spirochetes.

REPORT OF CASES

CASE 1.—(Lutheran Memorial Hospital.) A girl, aged 11, gave a history of recurrent sore throat. The enucleated tonsils were about equal in size, measuring 2 cm. in length, 1.7 cm. in width and 1 cm. in thickness. Under the capsule of one, a round gray mass bulged, which on section proved to be an abscess 8 mm. in diameter containing gray pus of a foul odor. The wall of the abscess was well defined (fig. 1). Smears made of the pus revealed numerous fusiform bacilli, spirochetes and cocci. In aerobic cultures, *Streptococcus viridans* appeared; in the anaerobic, *B. fusiformis* and streptococci were found. On incising the other tonsil, a small abscess was encountered under the capsule. It measured 5 mm. in diameter and was filled with a white purulent exudate that was odorless. Smears revealed a few diplococci and short chains of streptococci, but no fusiform bacilli or spirochetes. In the microscopic sections made of the putrid abscess, the cavity was lined by irregular thin epithelium; in places no epithelium was found, and numerous pus cells, masses of bacteria and tissue débris were within the cavity. The abscess wall was densely infiltrated with polymorphonuclears, a moderate number of plasma cells and large numbers of lymphocytes (fig. 2). The remainder of the tonsil revealed hyperplastic lymphoid follicles, with a slight increase in connective tissue. The capsule was thickened markedly and contained small foci filled with pus cells. In Levaditi preparations, bacilli and spirochetes appeared in the wall of the abscess but did not show any zonal distribution.

CASE 2.—A man, a medical student, who complained of repeated sore throat with foul breath, had had his tonsils removed, but sore throat recurred. On examination considerable lymphoid tissue appeared in the upper portion of the right tonsillar

1. Pilot, I., and Davis, D. J.: J. Infect. Dis. **23**:231, 1918.
2. Pilot, I., and Brams, J.: J. Infect. Dis. **33**:134 (Aug.) 1923.

Fig. 1.—Abscess near capsule of the tonsil.

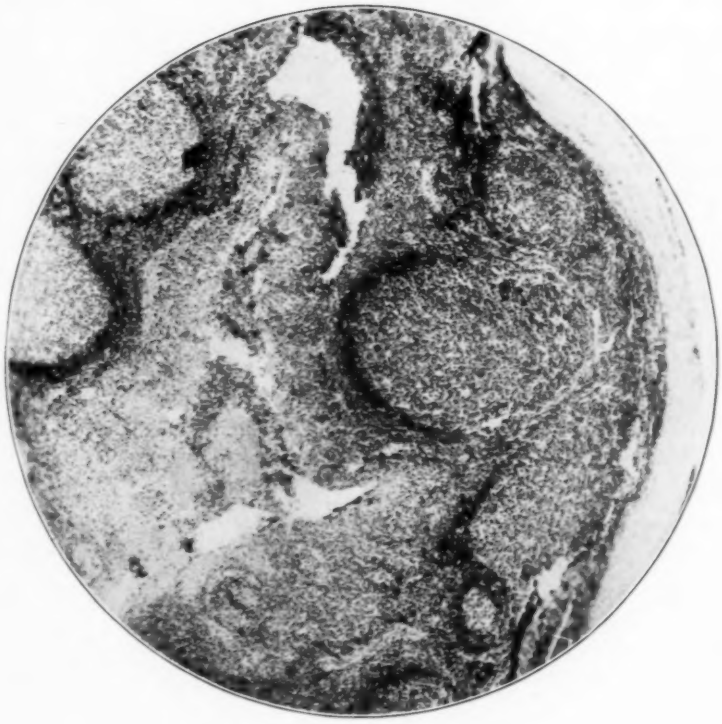

Fig. 2.—Section of tonsillar abscess.

fossa, with a foul purulent discharge oozing from the surface. A wire loop was introduced into a small abscess cavity containing foul pus. Smears revealed numerous bacilli, spirochetes and cocci.

CASE 3.—(Lutheran Deaconess Hospital.) A woman gave a history of repeated sore throat. The tonsils measured 2 cm. by 1 cm. by 1 cm. On section, there appeared distinct increase in fibrous tissue. A dilated crypt filled with foul smelling pus formed an abscess cavity. Smears of pus revealed numerous spirochetes, fusiform bacilli and cocci (fig. 3). The opposite tonsil presented pus in a crypt, with no odor, although in smears moderate numbers of spirochetes, fusiform bacilli and cocci appeared. In aerobic cultures, *Streptococcus viridans* and diphtheroids occurred; in the anaerobic, streptococci and pleomorphic forms of fusiform bacilli were found. Histologically, both tonsils presented crypts distended with pus cells, débris and bacteria. The lining epithelium was thin and infiltrated with polymorphonuclears. The underlying tissue contained a moderate number of polymorphonuclear cells. The lymphoid follicles were enlarged, with active centers. The connective tissue was distinctly increased and infiltrated with lymphocytes and a few polymorphonuclears. In the Levaditi preparations, the bacilli and spirochetes were seen in masses in the free exudate of the crypts, and a few in the lining tissue. The bacilli were pleomorphic; some were atypical and short, others long and threadlike, but not branching.

CASE 4.—(Lutheran Memorial Hospital.) The tonsils measured 2.5 cm. by 1.5 cm. by 1.5 cm. On section, a foul purulent discharge exuded, apparently from a crypt. The fibrous tissue was distinctly increased; the capsule was thickened. In smears, a mixture of bacilli, spirochetes and cocci was demonstrated.

Section revealed a distinct abscess cavity with necrotic walls, communicating with a crypt (fig. 4). The lining of the abscess was largely granulation tissue, surrounded by older connective tissue which was infiltrated with numerous lymphocytes and polymorphonuclears. The tonsillar tissue consisted of hyperplastic follicles, with a distinct increase of connective tissue. A moderate number of polymorphonuclears were under the crypt epithelium, and a few pus cells and bacteria were in the cavity. In the Levaditi preparations, numerous bacilli and a few spirochetes were seen in the necrotic zone, with no distinct migratory tendency of the spirochetes.

The striking features of these abscesses were their chronic inflammatory character with a tendency to necrosis and the production of a foul-smelling exudate. The smears revealed the bacilli, spirochetes and cocci in variable numbers; in cultures, pyogenic bacteria, especially streptococci, also appeared. It was not difficult to make a differentiation from true Vincent's angina, which in smears is characterized by the enormous numbers of fusiform bacilli, spirochetes and few other bacteria.

The tonsillar lesions associated with these bacteria resemble the lesions observed in certain forms of pulmonary abscess and gangrene. It is interesting to note in this connection that fusospirochetal pulmonary infection may follow tonsillectomy.[3] The middle ear [4] and the sinuses [5]

3. Pilot, I., and Davis, D. J.: Studies in Fusiform Bacilli and Spirochetes: Their Rôle in Pulmonary Abscess, Gangrene and Bronchiectasis, Arch. Int. Med. **34**:313 (Sept.) 1924.

4. Pilot, I., and Pearlman, S. J.: J. Infect. Dis. **33**:139 (Aug.) 1923.

5. Pilot, I., and Lederer, F. L.: Fusiform Bacilli and Spirochetes; Occurrence in Putrid Ethmoiditis, Ann. Otol. Rhinol. & Laryngol. **34**:366 (June) 1925.

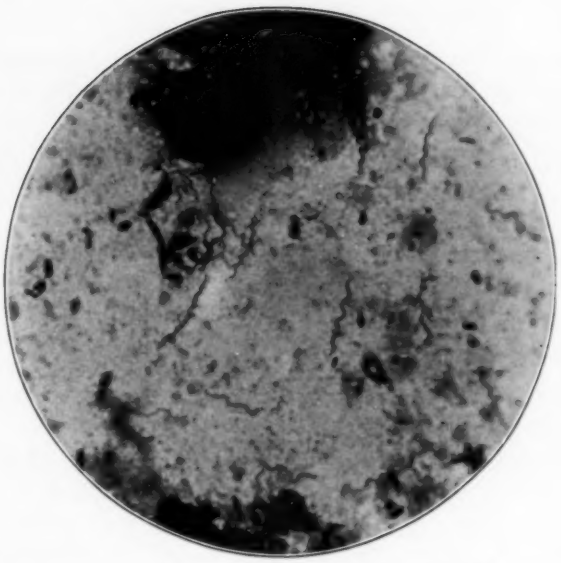

Fig. 3.—Smear of pus of abscess, revealing spirochetes, fusiform bacilli and cocci.

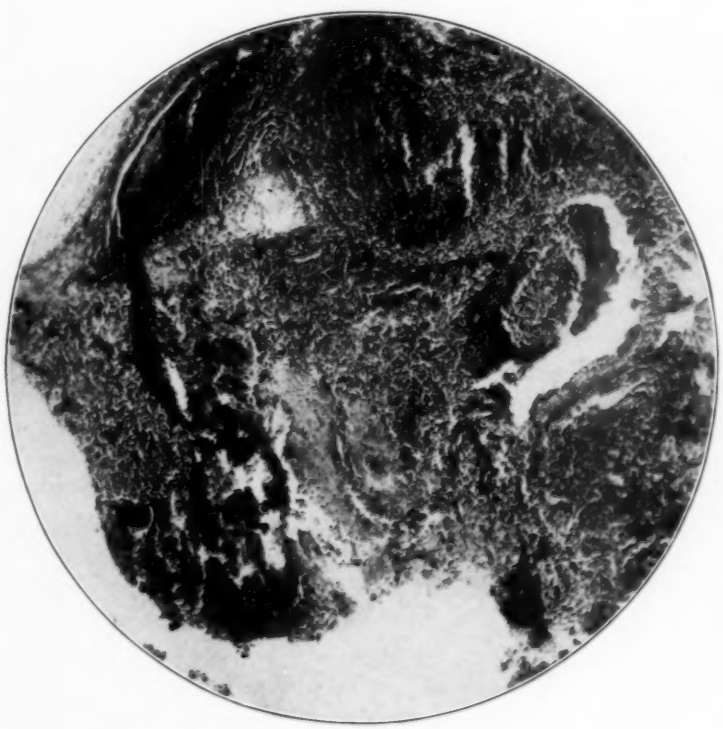

Fig. 4.—Section of abscess. Note the distinct necrosis.

may also become infected with these organisms. The anaerobes observed in these regions resemble morphologically those seen about normal and diseased gums and tonsils, and it would appear that the bacteria of the mouth about the teeth and in crypts of tonsil were the sources of infection.

SUMMARY

A chronic form of fusospirochetal infection of the tonsil is described. The exudate is usually foul-smelling and contains streptococci in addition to the anaerobes. The lesion is a chronic abscess, often communicating with a tonsillar crypt.

CHRONIC TONSILLITIS

MICROSCOPIC PATHOLOGY

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OAKLAND, CALIF.

I have examined microscopically all tonsils removed in private and in clinic practice at Stanford University hospitals in San Francisco for two years, in all about 2,000 pairs, with the accompanying adenoids when present. I shall describe the microscopic picture of such specimens, giving some new features and emphasizing some old ones. Various workers have touched on many of these points, but this summary of the pathologic observations is based on the primary inflammatory nature of the changes in the different tissues of the tonsil, and I do not attempt to make an artificial subclassification of the various phases of this single process. I believe that a clearer understanding of the meaning of chronic tonsillitis is thus derived. A clinical correlation is not appended.

ANATOMY

The faucial tonsil is essentially a lymphatic gland, composed, therefore, of lymphoid follicles with active germinating centers, surrounded by a delicate reticulo-endothelial stroma supporting the mature lymphocytic cells. The surface is of stratified squamous epithelium continuous with that of the pharynx, with its supporting fibrous submucous layer. This epithelium is normally projected into crypts which extend and ramify extensively, without a submucosa, deep into the tonsil stroma, with follicles grouped around them. A further reflection of a fibrous layer from the submucosa at the point where the mucous membrane passes from the pharynx to the tonsil encloses the latter as a capsule, outside of which lie pharyngeal fascia, muscle and mucous glands. Delicate septums pass toward the surface from the capsule, roughly separating each crypt and its adjacent follicles from the others.

The pharyngeal tonsil (adenoid) is composed of similar lymphoid tissue, immediately covered by ciliated columnar epithelium which bears no submucosa, the latter passing directly beneath the base of the adenoid. The adenoid is laid in saggital segments with clefts between, like separated segments of an orange, and thus does not have any compound crypts. Mucus glands are often found within the adenoid at its base.

THE TONSILS

Crypts.—Chronic tonsillitis, arising from infectious elements from the mouth, affects first the crypts, whereupon a leukocytic infiltration of the

epithelium occurs, at first consisting of about 30 per cent of polymorphonuclear leukocytes, the remainder being lymphocytes with a few plasma cells. As this infiltration progresses in degree, the epithelial layer becomes broadened and less distinct in outline, and finally a previous, disrupted band of crowded, degenerated cells, everywhere separated from each other by the invading leukocytes, can barely be recognized as

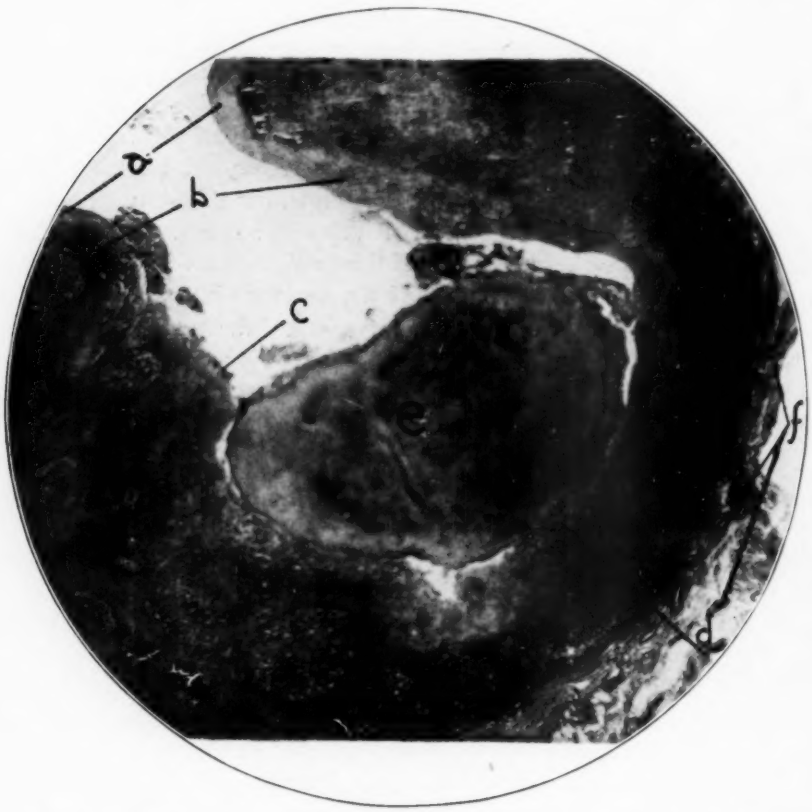

Fig. 1.—Entire crypt, showing chronic inflammatory stage. *a* indicates intact epithelium; *b*, beginning cellular infiltration; *c*, epithelium destroyed; *d*, granulations forming; *e*, fibrinous mass and purulent exudate; *f*, round cell infiltration of capsule. X 32.

the original membrane.[1] During these stages, surface cells may undergo keratinous degeneration and be cast off to form plugs of amorphous débris, around or below which frankly purulent exudate often collects. Masses of fibrin and degenerated cells may also form in the inflammatory exudate. If a special stain is used, bacterial colonies may be seen

1. Kellert, Ellis: The Pathologic Histology of Tonsils Containing Hemolytic Streptococci, J. Med. Research **41**:387 (May) 1920.

invading the sievelike epithelial wall, and fungi, spirochetes and yeasts have been reported similarly penetrating here. Calcification of masses, especially the fibrinous débris, may occur, and tonsilloliths thus arise.

Such infiltrative injury to continuity of cryptic epithelium was found in all but one pair of tonsils. Some call this a normal occurrence, but such interference with the integrity of stratified squamous epithelium

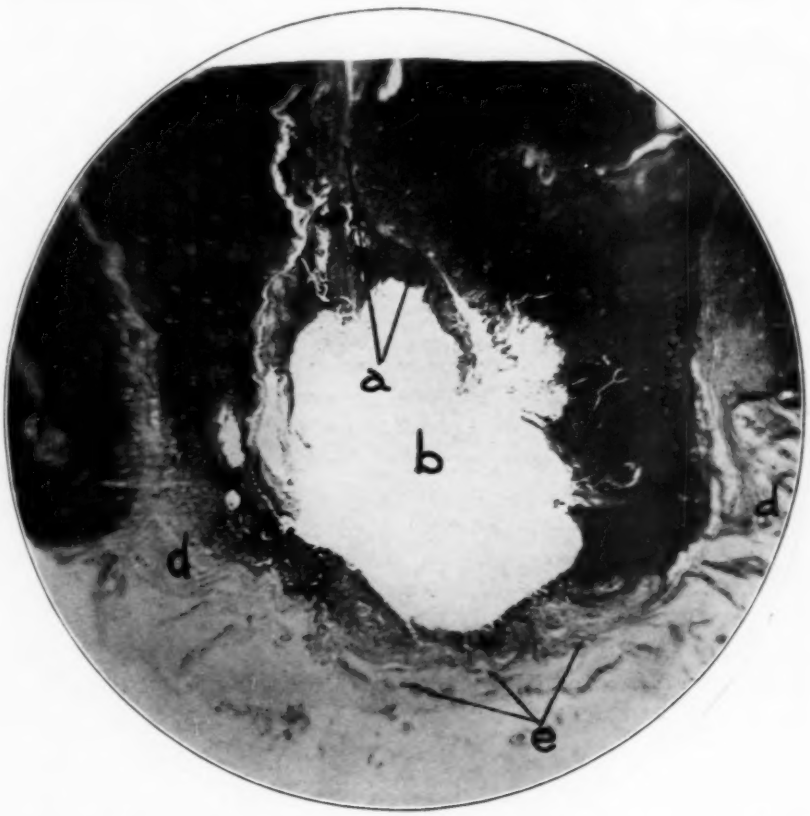

Fig. 2.—Granulations springing up to obliterate base of crypt. *a* indicates crypt lumen, epithelium gone; *b*, granulating crypt base; *c*, lymphoid follicles; *d*, beginning fibrosis of stroma; *e*, trabecula slightly fibrous; *f*, capsule with round cell infiltration. X 55.

does not find a counterpart in normality elsewhere. Its gravity of import may be questioned, but not its essentially inflammatory character.

Later the epithelial barrier is completely destroyed, leaving a surface of bare tonsil stroma, on which granulations usually spring up, forming "ulcers" in the crypts.[2] This is seen in one or more crypts in 70 per cent

2. Bell, H. H.: Histologic Changes in Excised Faucial Tonsils, Ann. Otol., Rhin. & Laryng. **33**:1224 (Dec.) 1924.

of all tonsils. The process of granulation then commences to obliterate the crypt, usually from the bottom up, as all pathologic processes are generally more advanced there; sometimes, however, granulation extends along the walls, when the lumen may be occluded, forming a completely enclosed, infected cavity below, which may remain only potentially an abscess at the base of the former crypt, lying near or immediately on the capsule. One such had penetrated the capsule, forming a small chronic

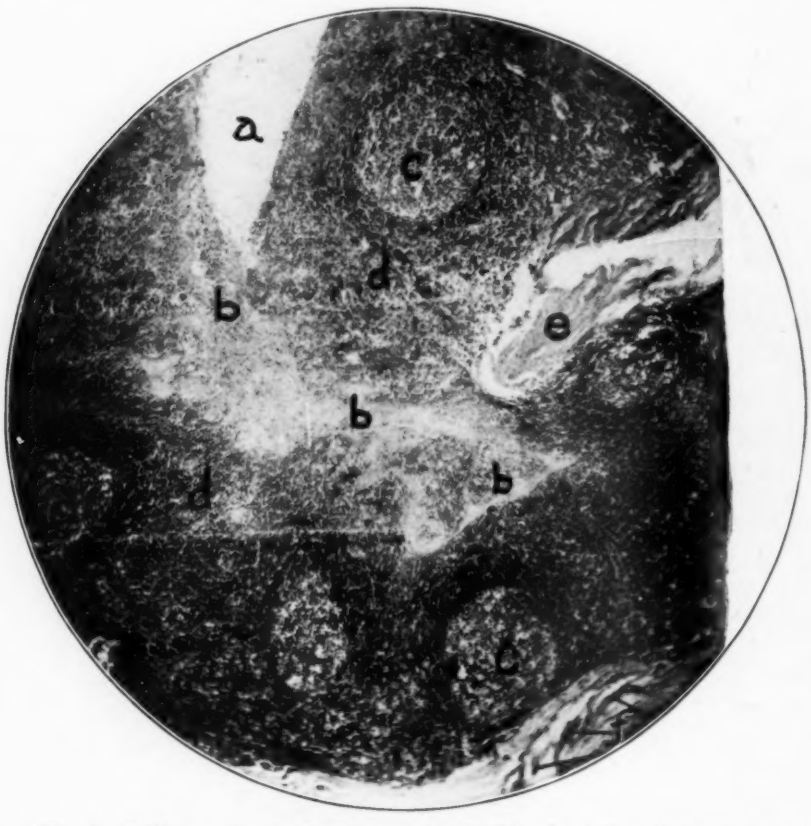

Fig. 3.—Obliterated crypt base. *a* indicates obliterated line of former crypt; *b*, slight hyperplasia of lymphoid follicles; *c*, beginning fibrosis; *d*, atrophic follicles; *e*, round cell infiltration of capsule. X 32.

peritonsillar abscess. At times such cavities become filled with amorphous débris, or a pus-filled cavity occasionally has a nearly intact epithelial lining. Complete and even obliteration of the crypts is occasionally seen.

The common picture of chronic crypt infection (fig. 1) is one in which cellular infiltration commences near the orifice, becomes increasingly marked below and finally destroys the epithelium, leaving a granu-

lating crypt-base. This is particularly frequent in children's tonsils, though advanced stages are seen there as well.

Stroma.—The usual change in the stroma of the tonsil is hyperplasia of the lymphoid follicles, responsible for the majority of "hypertrophied" tonsils, although enlargement may be due to fibrous replacement. With lymphoid hyperplasia the follicles are generally, but not invariably, enlarged, and always have a large, pale, active germinal

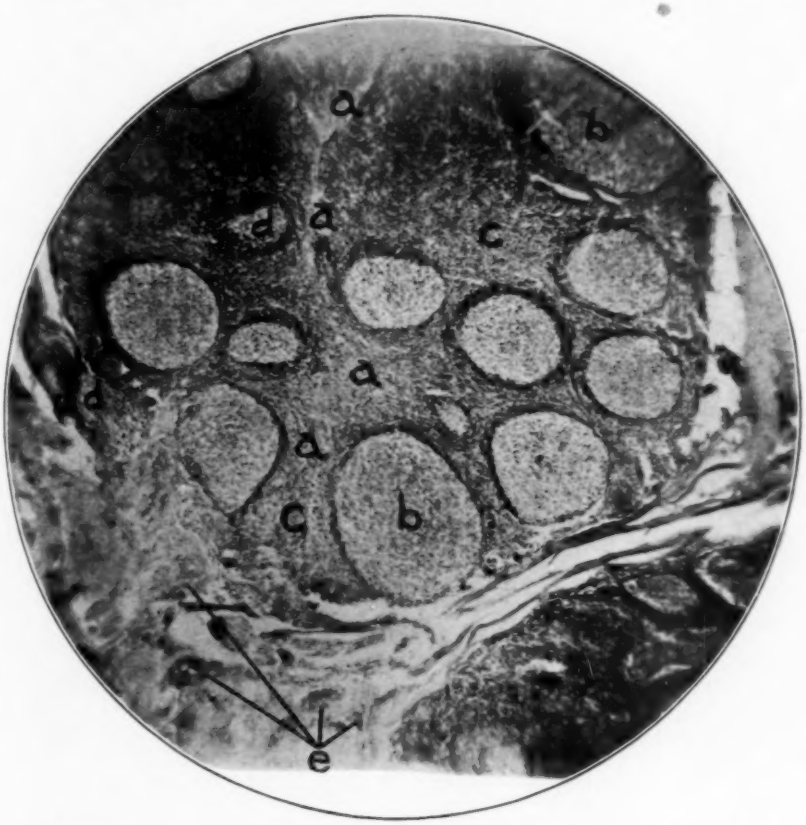

Fig. 4.—Crypt obliterated peripheral to base, where abscess has formed (purulent content lost in sectioning). *a* indicates crypt lumen obliterated by granulation; *b*, abscess cavity; *c*, atrophied follicles; *d*, thickened capsule; *e*, round cell infiltration. X 18.

center, with the peripheral ring of mature cells narrower than normal, a thin line in comparison with the proliferating center. The follicles may thus be so tightly packed together as to occupy practically the entire tonsil stroma, encroach on the crypts and be distorted and irregular in outline. This again is the usual picture in the child's tonsils, and some assert that it is physiologic. It is not found solely in children, is not

universal in their tonsils, is often irregularly mixed with other pathologic processes of the stroma, and is usually proportional to the severity of the other early pathologic conditions, hence it is regarded as of some pathologic significance.

Fibrosis of the stroma is the next stage, beginning as a diffuse increase in fibroblastic content, usually proportional to the extent of granulation of the crypts, and progressing until the lymphoid follicles

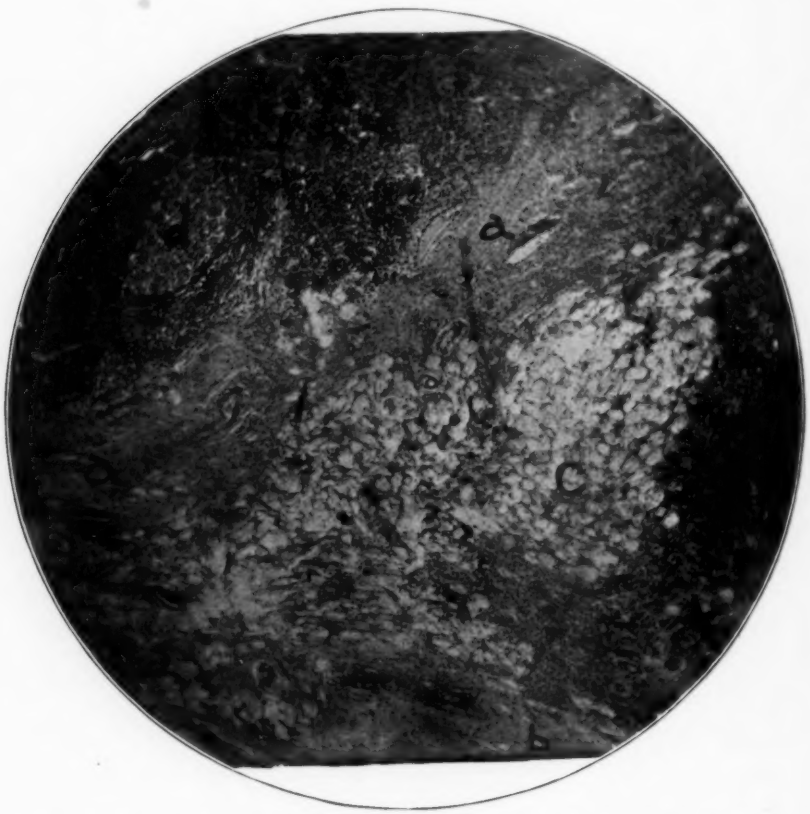

Fig. 5.—Capsular and trabecular thickening with fatty infiltration. *a* indicates thickened fibrous trabecula; *b*, thickened capsule; *c*, fatty infiltration of fibrosed stroma. X 55.

are encroached on, squeezed out in places, and finally obliterated in some instances, the tonsil being converted into a dense fibrous mass with thin, irregular patches of round cell survivors and with crypts obliterated or drawn into distended, shallow pockets.

During the later stages of fibrosis, there is also commonly an intracapsular infiltration by fat cells, which produces a marked fatty degeneration (fig. 2).

Recent work by others has shown thrombosis of the venules of the tonsil stroma, where comparatively large collecting veins course parallel to and immediately beneath the epithelium; these thrombi have been shown to be infected.[3]

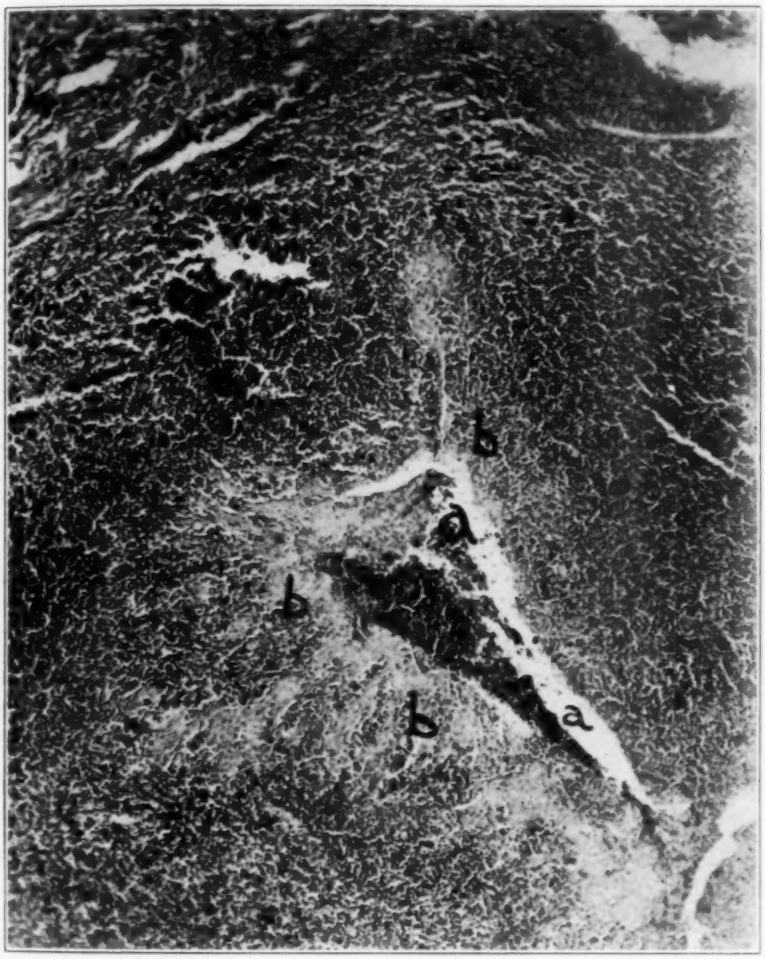

Fig. 6.—Pus and granulations in cryptlike cleft of adenoid. *a* indicates pus-filled cleft; *b*, granulating walls. X 85.

Capsule and Peritonsillar Tissue.—Apparently not an active structure, the fibrous reflection of submucosa encapsulating the tonsil is often involved in the chronic inflammatory process. This is first evidenced

3. Bell, H. H.: Bacterial Flora of Faucial Tonsils, Ann. Otol., Rhin. & Laryng. **33**:305 (June) 1924.

as a round-cell infiltration between the fibril strands, present in from 60 to 70 per cent of tonsils. It is usually greatest near the bases of the most diseased crypts. This infiltration of round cells, in about 10 per cent of tonsils, extends beyond the capsule, involving fascial and muscular tissue and mucous glands, and has been called chronic peritonsillitis. This might be expected from the band of injection frequently seen surrounding the chronically infected tonsil.

Fibrous thickening of the capsule then commences, and it can become dense and many times its normal width in section, with round cell infiltration persisting. The trabeculae extending into the tonsil stroma take part in this fibrosis, and the peritonsillar tissues become involved, producing the "adhesions" that are troublesome in tonsillectomy. In about 25 per cent of markedly thickened capsules large or small islands of hyaline cartilage appear, varying from an indistinct collection of a few cartilage cells to large and multiple masses. At times these ossify, and I have seen two pairs of tonsils with an almost complete bony capsule.

Summary.—A rapid review of the processes above described gives a composite picture. Infectious menace is first met in the tonsil by an inflammatory reaction and leukocytic migration into the epithelium and space of the crypts and by hyperplasia of the lymphoid follicles; a prolonged encounter of attacking organisms and leukocytes destroys the cryptic lining, and granulation barriers form; by proliferation and contraction of these granulations an attempt is made to obliterate the septic space from below outward, but the depth and ramification may pervert this process so that purulent pockets are obstructed or walled off to form abscesses; fibrosis of the stroma commences to strengthen the barrier, but this in time destroys the active elements without extruding the offending matter; as the capsule and peritonsillar tissue become involved in the chronic inflammatory reaction, fibrosis and thickening occur, and cartilaginous and bony walls of defense may develop. However, these barricading efforts of nature seldom succeed in expelling the invading hosts from the cryptic labyrinth, although complete destruction of the essential tonsil structure and extensive degenerative changes may be produced.

ADENOIDS

Simple lymphoid hyperplasia is the most common process in the adenoid; it does not differ from that in the tonsil, although its mechanical effects are of greater moment. Purulent nasal discharge may collect on the adenoid and in its "crypts," and some intrinsic pathologic process may be present and obscured beneath this extraneous contamination. The

adenoid "crypts" are less complex and are dependent, while the adenoid is not buried but protrudes. Despite these advantages, actual chronic inflammation, as evidenced by ulceration in the crypts and the formation of granulations and purulent exudate, is sometimes seen here as in the tonsil. As a result there is an occasional chronic focus of infection in the adenoid.

1904 Franklin St.

THE METHOD OF CHOICE FOR THE CORRECTION OF SADDLE NOSE*

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MONTREAL

In this paper, I relate the results of my personal experience for the correction of saddle nose, and discuss the arguments which underlie my opinion. At the onset let me say that I prefer to practice autoplasty by means of costal cartilage. Indeed, particularly since the war, almost all the surgeons have abandoned the metallic prothesis, (gold, silver, platinum and aluminum) for reasons which are now well known to us.

White petrolatum (Gersuny, 1900), paraffin (Eckstein, 1901)—later, a mixture of these two substances—gutta percha and rubber have been discarded for good reasons.

Rueda, who attempted (1913) to introduce a bundle of catgut under the skin for the correction of saddle nose, had no imitators.

The same may be said of periosteum (Reverdin, 1879), muscle (Vignard) and fascia (Fritz Koch, 1914). All these grafts, as well as catgut, are absorbed more or less rapidly, and as a consequence do not give any esthetic result.

Besides the inorganic substances already referred to, celluloid, which has had a certain vogue for many years, should also be mentioned. In 1890, Fraenkel began to use it for cranioplasty. In rhinoplasty, Föderl first employed this substance in 1903. This foreign body is often tolerated by the tissues of the nose; it is, however, a little irritating, and in many circumstances it is sooner or later eliminated.

In 1918, Joseph of Berlin, the great initiator of nasal plastic surgery in Europe, advocated ivory for the correction of saddle nose. This organic material is now well known, especially since the researches of Carnot, who demonstrated that its chemical composition very much resembles that of human bone. However, it is well to remember that there is on the market an inorganic pseudo-ivory having a vegetable composition, which is likely to produce irritation, and which must not be employed. Pure ivory can render great service, because it is generally well borne after having been encapsuled by fibrous tissue. In other circumstances, on the contrary, even if the operation is performed according to perfect aseptic principles, it produces a mechanical irritation and is not tolerated. This prothesis, being very hard, must be manipu-

* Read before the Section on Oto-Rhino-Laryngology of the American College of Surgeons, Montreal, October, 1926.

lated with saws, rasps and other special instruments; for this reason, its use is rather complicated.

As to animal grafts, it is recognized by all authors that they are always absorbed and are replaced by fibrous tissue of new formation; this tissue does not give any cosmetic result, or it gives a very poor result. In order to make these animal grafts more resistant, Magitot conceived the idea of immersing them in a 20 per cent solution of formaldehyde for eight or ten days; nevertheless, I believe that before one can pronounce definitely on their stability, they must undergo the test of time.

Israël, in 1895, first employed the tibial crest in rhinoplasty. Since then, especially in Germany, the osteoperiosteal fragments, taken preferably from the leg, are in favor and are commonly employed. In order that the bony graft may succeed, it is essential to place it in contact with the nasal bones and to perform the operation in an aseptic manner. Even if these two conditions are fulfilled, partial or total resorption often occurs, whether this graft is covered with its periosteum or not. Should an error of asepsis occur during the operation, the transplant suppurates and is invariably eliminated in full.

To Nélaton belongs the credit of having introduced, in 1904, the use of costal cartilage for the correction of saddle nose. He was inspired by the works of von Mangold, who, in 1899, employed this substance for autoplasty of the larynx and trachea. From all points of view, this cartilage is ideal for this kind of surgery. It is easy to obtain, and there is no danger of complications. It is much more easy to model than bone or any other organic or inorganic substance. Among all the foreign bodies enclosed in the nasal pyramid, it is the least exposed to infection. Tolerated perfectly, it maintains the esthetic appearance given at the time of operation. In 1913, J. S. Davis of Baltimore, having made numerous transplants of costal cartilage on dogs, observed that these grafts—which in certain cases had remained during nearly two years—did not increase in volume and did not become absorbed, and that there was practically no sign of microscopic degeneration, whether the cartilage was covered by its perichondrium or not. Morestin of Paris, in plastic surgery of the face, one of the most skilful and expert surgeons in Europe, also shared this opinion. Although some observers have found that after a certain length of time these transplants have a tendency to transform themselves into fibrous tissue, none of them has ever asserted that the transplants diminish in volume; from the cosmetic point of view, this is most important. Furthermore, to increase their resistance, it is better to insert the grafts with their perichondrium. Naturally, the cartilage of the septum or of the ear, employed for the correction of small depressions of the nose, is much more likely to disappear than the large or small cartilaginous costal grafts; experience has proved that this is nearly always true.

When it is necessary to take a graft, almost all authors advise the selection of the sixth, seventh or eighth rib. The pain following this operation is considerable, and the costal break takes much time to repair. For these reasons, a certain number of patients refuse this kind of autoplasty. For many years, I have used the cartilage of the first floating rib for the correction of saddle nose. This cartilage, which can be seized and freely moved with the fingers in the greater number of patients, is easily resected. The necessary incision for the removal is very small. Entirely covered by its perichondrium, it offers more resistance to fibrous transformation than all other transplants. For those patients who refuse general anesthesia, the graft can easily be taken without pain under local anesthesia. If in certain cases the nasal concavity is so marked that it may not be possible to fill it with the cartilage alone, it is a simple procedure to cut in full bony rib in order to have a larger graft. Carter of New York asserts that he obtains excellent results in rhinoplasty by employing osteocartilaginous grafts. For all these reasons, I strongly recommend the use of the cartilage of the first floating rib for the correction of saddle nose as being the method calculated to give the best success. Moreover, patients can be assured that after the operation there will be scarcely any pain in the side, on account of the compressive bandage, and that at the end of eight or ten days, they will practically be cured. During and since the war, I have used this technic many times, and I can say that so far I have not had any set-back. In support of what I have said, I report briefly two cases.

REPORT OF CASES

Case 1.—*History.*—On Jan. 19, 1925, Mr. A. B., aged 32, consulted me because he had a saddle nose. He said that twelve years before he had been struck on the nose by a baseball; until that time his nose had been straight. The hemorrhage was treated by a general practitioner. About three weeks after the trauma, the inflammation becoming worse, a rhinologist made an incision for a suppurative hematoma of the septum. This hematoma healed rapidly, but later he noticed that his nose was becoming more and more concave. As the nasal fossae had been obstructed since the accident, a slight operation had been performed on both sides of the septum three years before. This surgical intervention, performed with a saw, improved the breathing.

The patient presented no manifestation of acquired or hereditary syphilis.

Examination.—On examination, I found a symmetric concavity of the lower third of the nasal pyramid. The lower part of the nasal bones was lightly flat (fig. 1).

Anterior rhinoscopy showed a straight septum. However, the septum opposite the trauma was a little thickened. As the turbinate bones were not hypertrophied, the breathing was not obstructed. Rhinitis and pharyngitis were shown by posterior rhinoscopy.

I explained to my patient the different means for the correction of saddle nose, and we decided to have recourse to the costal cartilage. January 23 was fixed as the date for operation, and I prescribed a nasal antiseptic salve.

As it was agreed that I should employ a piece of cartilage, I had to choose the spot best suited for its introduction. The operation of von Mangold (1889), which consists in making a cutaneous incision between the eyebrows at the inferior concavity and forming a tunnel under the skin of the nose for the reception of the graft, leaves a slight scar. However, if there is even a slight infection, the drainage is rendered practically impossible because the opening is above, and the graft is in danger of being eliminated.

Fig. 1.—Patient with saddle nose caused by a blow from a baseball.

Carter of New York, in 1910, modified von Mangold's method by making a curvilinear incision as deep as the periosteum at the superior concavity. This in turn is sectioned in a horizontal plane, and a recess is made toward the glabella. The subcutaneous tissues afterward are freed as far as the tip of the nose, and the graft is placed in such a manner that its superior extremity lies under the periosteum of the nasal apophysis of the frontal bone. In 1919, Carter abandoned this method and adopted the endonasal route in order to facilitate drainage, as I have just mentioned.

In an effort to hide the cicatrix, Léon Dufourmentel, in 1919, conceived the idea of making the incision in the eyebrow. Frank and Strauss, in 1921, described exactly the same method, as new. In this

method also drainage is unpractical. Owing to the length of the incision and the tunnel for the graft, the operation and any manipulation of the transplant are rendered difficult.

In 1898, Monks of Boston advocated the making of an antero-posterior cutaneous cut under the tip of the nose, extending slightly to the skin over the columella, and afterward making a tunnel from below upward. Lewis, in 1922, tried to take as his own Monks' method, in making slight modifications. He makes the same kind of incision, but a little more posterior, opposite the columella, and in detaching the skin of the nasal pyramid at the tip of the nose he prepares a point of support for the inferior extremity of the graft when placed.

In order to reach the part of the nose to be repaired, Portmann of Bordeaux (1923) makes a curvilinear incision of about 3 cm., passing below the tip, and then separates the tissues.

With the same idea, and to obtain more space, Gillies of London (1923) detaches all the skin over the columella in making an incision at the philtrum and at its junction with the mucous membrane of the nostrils; after having lifted this flap, he forms a canal under the pedicle. At first I will say that with Monks', Portmann's and Gillies' methods, the cicatrix is almost invisible. However, as the nasal vestibule is very narrow at its superior part and the skin which covers the tip of the nose is very thin, I fear that in separating the tissues of the nasal pyramid—even after the dilatation produced by procain hydrochloride and epinephrine—the mucous membrane of the nostrils might be torn. This would expose the patient to a secondary infection and to the elimination of the graft. In my opinion, these methods should be reserved for the correction of thin hump noses, because even if the wound became septic in these cases, there would be no serious consequences to fear in view of the ease of drainage.

The endonasal incision made at the inferior border of the triangular cartilage, advised by J. O. Roe of Rochester, New York, in 1887—the first to correct the different varieties of nasal deformities—without doubt represents the ideal method now employed by a great number of rhinologists in America and Europe. This process evidently does not leave even a trace of an exterior cicatrix. This method presents no danger of complications, and is easy of execution, especially if the Joseph's concavoconvex knife is used to tunnel a recess at the tip of the nose to anchor the inferior part of the graft. If the nasal fossa, through which the incision is made, has been prepared in an aseptic manner, there is no danger of infection. At first the suture of the lips of the incision might appear to offer some difficulty. Such is not the case if the Dupuy-Dutemps' needle, which he employs for the dacryocysto-rhinostomy, is used. This needle is curved at a right angle to its handle and has a hemispheric form. Furthermore, Joseph of Berlin, one of

the cleverest and most skilful operators of our day in rhinoplasty, who used the external method when he commenced his works on nasal deformities in 1898, since 1904 has had recourse only to the internal route. As a result of all these considerations and my personal experience, I decided to use this last method.

Operation.—After having cut the hairy follicles of the vestibule, irrigated the nostrils and applied tincture of iodine, I injected a solution of procain hydrochloride and epinephrine. A few minutes later, I incised the mucous membrane of the left side at the inferior border of the triangular cartilage, and I fashioned

Fig. 2.—Appearance of patient one month after rhinoplasty, with graft of costal cartilage in the nose.

a tunnel for the graft, at the same time preparing a support for it at the tip of the nose. I then chloroformed the patient and removed a piece of the cartilage from the first floating rib on the right side. This graft, carefully shaped, I placed under the skin of the nasal depression after having squeezed out the blood, and I sutured the incision with silk. Iodoform gauze in the nostril exerts slight compression. In order to steady the graft, I placed externally, transversally to the nasal pyramid, two small bands of adhesive tape; then I covered the face with a protective dressing. The costal wound was closed in its turn by means of three layers of sutures, and I applied the ordinary abdominal dressing. Postoperative sequelae were simple, and from the seventh day I gradually removed the stitches. Only a slight sensitiveness was felt during the first week, and the patient left the hospital sixteen days after the operation, satisfied with the result

obtained. His nose was straight, as shown in figure 2 taken one month after the rhinoplasty. I have seen him recently, and his esthetic appearance has not changed.[1]

CASE 2.—*History.*—Mr. C. L., aged 24, on April 27, 1926, consulted me about his nose, which was sunken. He said that he had never received a trauma, and that since birth his nose had always had the deformed shape. The deformity had been increasing with growth.

Examination.—I found a flatness of the nasal bones and a depression at their lower border. The tip of the nose, tilted up and soft, did not have any support. The nostrils were much dilated, especially the left one, a condition which gave to the patient a negroid appearance. The lips and the chin were prominent (fig. 3).

Fig. 3.—Patient showing arrest of congenital development of nasal skeleton.

By anterior rhinoscopy, I found that the two cavities were very large. The septum was straight, but presented at its anterior part no cartilaginous resistance. The head of the inferior turbinate bones was slightly atrophied, and there was a double chronic rhinitis with abundant nonodorous secretions. Posterior rhinoscopy showed a pronounced pharyngitis. The tonsils and larynx were normal.

The patient had suffered from a chronic suppurative otitis media since the age of 4 years. I did not find any sign of acquired or hereditary syphilis, and no members of his family had tuberculosis. The case therefore was one of arrest of congenital development of the nasal skeleton, which had to be corrected. I explained to the patient the various methods at my disposal for a successful result, and we decided to introduce a piece of costal cartilage by the endonasal route.

1. This patient was presented as cured before the "Société Médicale de Montréal," Jan. 7, 1925.

In the presence of this deformity, I considered Moulonguet's method (1920), which consists in making two incisions by the external route, one transverse under the tip of the nose and the other anteroposteriorly through the skin over the columella, joining the first at the middle. After having made a subcutaneous canal and splitting the septum, Moulonguet takes a cartilaginous graft from the ninth rib and cuts it into the shape of a square. This graft, applied in the operative wound, supports the tip of the nose, and at the same time corrects the saddle-back shape. However, in my case, the lack of development and the thinness of the nasal septum would have rendered the operation laborious, and on account of the hypersecretion in the nostrils, the slightest lesion of the mucous membrane would have produced infection and consequently elimination of the graft.

Sheehan's method would have been just as satisfactory. It consists in making an anteroposterior incision through the middle of the skin over the columella, from the tip of the nose to the philtrum. Having prepared a tunnel, Sheehan inserts a piece of costal cartilage bent at a right angle at the tip of the nose. The object of this graft, like that of Moulonguet's operation, is to support the tip of the nose in a good position, and to fill the nasal depression. I have not adopted this method for the reasons that I have mentioned in dealing with the question of external incisions. As a simple piece of rib well placed would produce the same cosmetic result, I adopted this method, and fixed the date of operation at May 6.

Operation.—Having followed the same operative technic for my two patients, I will not repeat the description. In the second case everything turned out as normally as in my first case. When I inserted the graft in the nasal depression, I was careful to have the pressure on the most concave part—the graft being cut in consequence—in order not to lower the tip of the nose, but on the contrary to raise it slightly. Fifteen days following rhinoplasty, the patient returned to his family absolutely cured, after having suffered very little from his side during the first week. I continued to sterilize the nostrils with a salve, and on June 7, my patient again came to the hospital to undergo an operation for the correction of the dilated nostrils on the same day. After the operative field having been made aseptic, I injected a solution of procain hydrochloride and epinephrine into the nasolabial folds. Instead of using the concavo-convex scissors to cut the nostrils, a method usually employed in the United States, I chose the bistoury, controlling the incision with the finger in the nasal fossa. Thus practiced this incision is much neater than one made with the scissors, which have a tendency to crush the tissues; the coaptation is better, and the esthetic result is more perfect. I also removed from the two alae of the nose a little triangular piece with its base below, limited by the nasolabial folds. At first I operated on the right side, the least dilated, and on the left removed a little larger flap in order to obtain a symmetrical correction proportionate to the broadness of the face. I sutured with silk and adjusted an internal and external nasal dressing. I obtained a union by first intention, and the patient returned home ten days after the second operation. The incision, hidden in the nasolabial folds, was already hardly visible. The nostrils were narrowed, while allowing good breathing, and the nose itself was quite straight, as shown in figures 4 and 5 taken three months after the first rhinoplasty.

Fig. 4.—Profile view of nose three months after rhinoplasty, with a graft of bone from a rib.

Fig. 5.—Front view of nose three months after first rhinoplasty.

I suggested to my patient the diminishing of the prominence of his lips by removing two ellipses of buccolabial mucous membrane on a horizontal plane. He refused, however, declaring himself much pleased with the result.

COMMENT

I believe that the ideal method for the correction of depressed nasal deformities consists in making an internal incision and, after having prepared a tunnel, inserting a piece of the cartilage of the first floating rib. When the graft is placed in position, the application of two little bands of adhesive tape transversally to the nasal bones fixes it, and consequently offers better conditions for adhesion with the surrounding tissues. Carried out in this manner, the operation is more likely to be successful by this than by any other method.

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1924—Maliniak, J.: Comparative Study of Ivory and Organic Transplants in Rhinoplasty. Endo-Nasal Operative Technic of Some Nasal Deformities with Report of Cases, Laryngoscope **34**:882 (Nov.).

1925—Maliniak, J.: The Use of Ivory in Rhinoplasty, Arch. Otolaryng. **1**:599 (June).

1926—Sébileau, P.: La vie des greffons cartilagineux et osseux, Le Monde méd. May 15.

CORRECTION

Attention has been called to the fact that the article by Dr. Francis V. Gowen, "Tonsillectomy by Nerve Block Anesthesia" (Arch. Otolaryng. **4**:421 [Nov.] 1926) fails to give credit to Drs. Yankauer and Thompson for work which unquestionably covers the subject in its present day method. Data can be found in the following articles: Yankauer: *Laryngoscope*, May, 1909; Thompson: Nerve Blocking for Local Anesthesia in Tonsillectomies, *Annals of Otolaryngology, Rhinology and Laryngology*, September, 1920.

PROGRESS IN OTOLARYNGOLOGY

A Summary of the Bibliographic Material Available in the Field of Otolaryngology

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PERORAL ENDOSCOPY

A REVIEW OF THE LITERATURE

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Laryngoscopy, bronchoscopy, esophagoscopy and gastroscopy provide a means of direct examination of the air passages and the upper food passages. Direct inspection, combined with certain supplementary measures, give positive information, leaving nothing to the imagination. In spite of these methods of objective diagnosis, little progress has been made in the treatment for certain conditions of the esophagus and bronchus; this is especially true of malignancy.

ESOPHAGOSCOPY IN DISEASE

Malignancy of the esophagus remains a practically hopeless disease. The mortality rate today is the same as it was when the first case was observed and described.

Chevalier Jackson [1] says that the thoracic surgeon has made little progress in the treatment of cancer of the esophagus because he never sees these cases in the early stage. The reasons for this are:

1. Every case of esophageal cancer is a medical case until it is too late for surgical cure, not only because of extension and metastases, but also because the patient is a hopeless subject for any kind of major operation.

2. The diagnostic means advocated, first or exclusively, in the textbooks are always negative in the early stages of the disease.

3. The history of the case is useless diagnostically, and often directly misleading. Cancer of the esophagus may exist in a patient giving a history of only a few days of dysphagia. On the other hand, some of the patients give a history of twenty years of dysphagia. Inferential exclusion of cancer would be wrong in both instances. A history of intermittent stoppage of food with normal intervals is supposed to indicate spasm. Here inference is wrong again; intermittent dysphagia is present in all cases of cancer at some stage.

4. Blind bouginage is always negative in the early stages because it depends on obstruction. Cancer of the esophagus is never obstruc-

1. Jackson, Chevalier.: Why Does Not the Thoracic Surgeon Cure Cancer of the Esophagus? Arch. Surg. **12**:236 (Jan.) 1926.

tive early. It takes a large growth in a loose, resilient, redundant tube like the esophagus to cause obstruction. Sloughing cancer may not be obstructive, even in a late stage. The bougie may be stopped by a normal fold or a nonmalignant stenosis; it may be bloody from contact with normal mucosa; it may be foul from septic lymphoid tissue in the pharynx. Bouginage is an inferential method, late and inconclusive at best, fatal at worst.

There are only two safe, certain and early methods, namely, the roentgen-ray examination and esophagoscopy.

What the thoracic surgeon needs to cure cancer of the esophagus is an early and absolutely positive diagnosis. This can be made in only one way, namely, with the esophagoscope. There is good reason for believing that when every patient with supposed "globus hystericus" or with the slightest subjective abnormality in swallowing is promptly examined with the esophagoscope, the thoracic surgeon will show a good percentage of cures.

A cancer not any larger than an orange seed can be diagnosed just as positively in the esophagus as on the cervix.

Hill [2] considers esophagoscopy as the only accurate means of diagnosing conditions of disease in the gullet. Roentgen-ray study with an opaque substance is useful, but it cannot take the place of direct vision.

In a review of the symptoms of esophageal disease, I [3] pointed out the importance of careful investigation of the esophagus of every patient who complains of difficulty in swallowing. A diagnosis of globus hystericus should not be made until after complete and thorough studies have failed to reveal any evidence of disease. Nor should an esophageal examination be considered complete until after a roentgen-ray study of the swallowing function and an esophagoscopy have been considered.

In the roentgenographic study of the esophagus, Manges [4] recommends the use of the right-oblique-prone posture, especially for the thoracic portion. In this way, the entire esophagus can be kept distended as long as the patient drinks, and when drinking through the tube the patient also takes in less air. With this position, the esophagus, distal as well as proximal to the lesion, is distended with the opaque mixture.

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2. Hill, W.: Endoscopy of the Lower Air Passages and Upper Food Passages in Diagnosis, Practitioner **116**:26 (Feb.) 1926.

3. Clerf, L. H.: The Diagnosis of Diseases of the Esophagus, Virginia M. Monthly **53**:279 (Aug.) 1926.

4. Manges, W. F.: Right-Oblique-Prone Posture for Study of the Esophagus, Am. J. Roentgenol. **16**:374 (Oct.) 1926.

The advantages of direct inspection of a lesion of the esophagus, with a biopsy when necessary, was well shown in a case of benign tumor of the esophagus reported by Vinson [5] and his co-workers. A diagnosis of hemangioma of the esophagus was made by esophagoscopy and biopsy in the case of a man, aged 70, who complained of dysphagia. Following two treatments with radium which had been esophagoscopically placed, some improvement in swallowing was observed. Later esophagoscopy showed the growth greatly decreased in size, and the patient was free from all esophageal symptoms.

Not only is the esophagoscope of inestimable value in completing the diagnosis of diverticulum of the esophagus, but it is of vast assistance in aiding the surgeon in the treatment of these cases. Jackson and Shallow [6] believe that the use of the esophagoscope while the surgeon is doing his work (Gaub-Jackson) is the operative method of choice, because aspiration pneumonia is practically eliminated; the easy access to the sac by the use of the esophagoscope distinctly limits dissection, and hence lessens the danger of mediastinitis; by transillumination and protrusion of the sac on the esophagoscope the structure is readily identified and its fundus found, and the time of operation is shortened fully one half.

BRONCHOSCOPY IN DISEASE

Malignant Disease of the Lungs.—Without the aid of direct inspection and biopsy, an early diagnosis of malignancy of the lungs is extremely difficult, if not impossible. Ultimately a diagnosis can be established by the ordinary methods of examination, just as it can at autopsy. Obviously, this offers little consolation to the patient. Early diagnosis of cancer in any part of the body is imperative for surgical cure.

McCrae [7] calls attention to what is usually described as primary carcinoma of the lung as being in reality secondary in the lung tissue proper, with the primary growth in a bronchus. This may have real importance in one regard, namely, in early diagnosis. Bronchoscopy gives us a means of positive diagnosis of new bronchial growth in some cases. Early diagnosis of bronchial carcinoma offers some chance of treatment. He discusses the clinical features of bronchial carcinoma, and emphasizes the need of giving this condition a more important place in the differential diagnosis of obscure conditions of the lung.

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5. Vinson, P. P.; Moore, A. B., and Bowing, H. H.: Hemangioma of the Esophagus: Report of a Case, Am. J. M. Sc. **172**:416 (Sept.) 1926.

6. Jackson, C., and Shallow, T. A.: Diverticula of the Esophagus, Pulsion, Traction, Malignant and Congenital, Ann. Surg. **83**:1 (Jan.) 1926.

7. McCrae, T.: Carcinoma of the Bronchus, M. Clin. N. Amer. **10**:11 (July) 1926.

He further stresses the value of bronchoscopy as an aid in early diagnosis, just as inspection of the esophagus can contribute to early diagnosis of cancer of that structure, and, unless an early diagnosis is made, the patient can hope for little assistance from the surgeon.

The frequency of cancer of the lung is about 1 per cent of all cases, and, according to Burrell,[8] about 90 per cent of these have their origin in the bronchus. Bronchoscopy, therefore, is of the greatest value in the early recognition of these growths. Often a specimen of tissue can be removed and a positive diagnosis established. In cases of obscure and unusual signs in the chest, the function of the physician is to make an early diagnosis, and he should not rest satisfied with a diagnosis, however probable, until it is absolutely confirmed after a complete and thorough examination.

In reviewing three of his own cases of malignant tracheal tumors and the record of a fourth case not observed by him, Adam[9] concludes that the combination of cough, occasional hemoptysis, apparent good health and the absence of obvious intrathoracic signs suggests new growth in the tracheobronchial tree, and demands an endoscopic investigation.

In a clinical and pathologic study of primary cancer of the lung with a report of twenty-one autopsies, Grove and Kramer[10] refer to the writings of Chevalier Jackson and his associates in which they advocate bronchoscopy for the early diagnosis and treatment of pulmonary tumors, also to the cases of Orton and Greene, which were diagnosed and treated by bronchoscopy. The writers conclude that, with the more frequent use of the bronchoscope and with recognition of the fact that primary carcinoma of the lung is not rare, this clinical entity will be diagnosed more commonly antemortem; also, that the use of the bronchoscope both for diagnosis and treatment opens a field for treatment in a condition for which the prognosis was formerly unfavorable.

Brunn[11] stresses the importance of bronchoscopic examination in the early diagnosis of primary pulmonary carcinoma.

I[12] reported two cases of carcinoma of the bronchus diagnosed bronchoscopically. In this report I stated that cancer of the lung pre-

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8. Burrell, L. S. T.: The Diagnosis and Treatment of Intrathoracic New Growths, Lancet, **210**:435 (Feb. 27) 1926.

9. Adam, J.: Four Cases of Trachael Tumors, J. Laryng. and Otol. **41**: 174 (April) 1926.

10. Grove, J. S., and Kramer, S. E.: Primary Carcinoma of the Lung, Am. J. M. Sc. **171**:250 (Feb.) 1926.

11. Brunn, H.: Primary Carcinoma of the Lung, Arch. Surg. **12**:406 (Jan.) 1926.

12. Clerf, L. H.: Bronchoscopic Aspects in the Diagnosis of Nontuberculous Pulmonary Disease, Atlantic M. J. **29**:839, 1926.

sents benign characteristics, so that, if the diagnosis is made early, chances for a cure should be excellent, but that the diagnosis is rarely made early; in fact, it is too often made at autopsy. I concluded that an early diagnosis of malignancy can be made only by bronchoscopy.

Myerson [13] reports the case of a patient who complained of progressive shortness of breath. Various diagnoses given by different internists who examined the patient were: asthma, neoplasm of mediastinum, aneurysm and tuberculosis. The diagnosis of carcinoma of the bronchus was made by bronchoscopy, and verified by histologic examination of a portion of the tumor removed by the bronchoscopist.

Pneumonography.—Increasing the visibility of the tracheobronchial tree with the aid of radiopaque substances introduced bronchoscopically or by other methods is a procedure which is constantly becoming more useful. This has naturally led to many different methods of introduction of the substance. In addition to the use of bismuth subcarbonate (Jackson) introduced by bronchoscopic insufflation, iodized oil is employed extensively.

Rist [14] and his co-workers report a case of bronchial stenosis which was graphically shown by the bronchoscopic instillation of iodized oil 40 per cent, after attempting to outline the bronchus by intratracheal instillation of the oil. The authors suggest that "bronchial stenosis" be added to the list of pulmonary conditions in which the injection of iodized oil is of great value, and also believe that the instillation of iodized oil directly into the suspected diseased bronchus under bronchoscopic control will considerably lessen the difficulties in treatment.

In a report based on fifty of his own cases, Ballon [15] concludes that the bronchoscopic method of injecting iodized oil is safer and more satisfactory than any other method, by virtue of the added diagnostic advantage from having observed by direct vision the actual condition of the bronchi and lungs. The quantity of iodized oil used varies from 10 cc. to 40 cc., and the author did not observe symptoms of iodism in any case.

In his discussion of Grady's [16] presentation of the use of iodized oil in the bronchial tree, Manges agrees that the oil is useful in demon-

13. Myerson, M. C.: Obscure Chest Conditions with Positive Bronchoscopic Findings, Laryngoscope **36**:193 (March) 1926.

14. Rist, E.: Jacob, P., and Soulas, A.: Extrinsic Bronchial Stenosis Revealed by Roentgen-ray Examination After Injection of Lipiodol Under Control of Bronchoscopy, Bull. et mém. Soc. méd. d. hôp. de Paris **50**:22 (June 18) 1926.

15. Ballon, D. H.: Lipiodol in the Diagnosis of Bronchopulmonary Lesions by the Bronchoscopic Method, Arch. Otolaryng. **3**:403 (May) 1926.

16. Grady, H. W.: Demonstration of the Bronchial Tree by Intratrachael Injection of Lipiodol, Am. J. Roentgenol. **15**:65 (Jan.) 1926.

strating pulmonary cavities and dilatations of the bronchi, especially in the dependent portion of the bronchial tree. He believes, however, that bismuth possesses advantages in certain cases, in that, when insufflated in a quantity sufficient to dust the bronchial wall, it permits of a more delicate differentiation of the bronchial lumen than does iodized oil. Irrespective of the substance used, he believes that bronchoscopic introduction should be the method of choice.

Iglauer [17] has found iodized oil of great value, not only in demonstrating lesions in the bronchi and lungs, but also in showing the extent of obstruction in cases of stenosis of the larynx.

Bronchoscopy in Diagnosis.—The value of direct inspection of the interior of the trachea and bronchi in the diagnosis of pulmonary disease is presented by Chevalier Jackson,[18] who observes that it has been noted that inferential diagnosis was satisfactory until methods of local examination demonstrated that the satisfaction was a matter of misplaced confidence, and that the diagnosis was generally wrong. In other words, local examination has revolutionized diagnosis and treatment. Bronchoscopy has done this in the matter of foreign bodies, and is doing it in other conditions. An accurate diagnosis as to the exact location and especially as to the type of lesion is fundamental in any scientific method of treatment of disease. These local conditions can be determined with great accuracy and with all the certainty of direct inspection.

In a categoric enumeration of the various afforded by bronchoscopy in diagnosis, Jackson [19] states that the interior of the bronchi and their orifices can be safely and quickly inspected and any abnormality in lumen, mucosa, or secretion determined by bronchoscopy; uncontaminated specimens of secretion can be obtained; obstructing masses of secretion can be removed, and specimens of tissue may be secured with precision; all data as to lesions can be definitely localized as to lobes and, except in infants, to portions of lobes. Pneumonograms can be made of any portion of the bronchial tree, and, what is most important, bronchoscopic inspection of the pathologic area gives objective data regarding a condition which, if present, may be dealt with bronchoscopically.

Myerson [13] observes that bronchoscopy is steadily gaining as a distinct aid in the recognition and understanding of obscure conditions in

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17. Iglauer, S.: Use of Injected Iodized Oil in Roentgen-ray Diagnosis of Laryngeal, Trachael and Bronchopulmonary Conditions, J. A. M. A. **86**:1879 (June 19) 1926.

18. Jackson, Chevalier: Chronic Nonspecific Infections of the Lungs, J. A. M. A. **87**:729 (Sept. 4) 1926.

19. Jackson, C.: The Bronchoscope as an Aid in the Diagnosis and Treatment of Pulmonary Infection, Atlantic M. J. **30**:139 (Dec.) 1926.

the chest. He believes that, with its increased use, bronchoscopy will contribute considerably to a better understanding of many lesions of the chest that heretofore have been baffling. As evidence of this, he cites two cases of syphilis of the trachea and bronchi which presented curious symptoms with obscure physical signs, and in which bronchoscopy contributed materially to the diagnosis.

Jesberg [20] agrees that endoscopy plays an important part in the diagnosis and treatment of diseases of the respiratory tract other than those caused by the presence of a foreign body. In an analysis of 341 endoscopic examinations and treatments carried out by him, he found only thirteen which were concerned with the removal of foreign bodies. He reports an interesting case of obstruction of the left main bronchus by a polyp, occurring in a child, aged 6 years. The symptoms of cough and expiratory wheeze with signs of bronchial obstruction suggested the presence of a foreign body. Bronchoscopy revealed a soft, rounded, pedunculated tumor, which was removed. The histologic report was polyp. There was not a recurrence of the symptoms and signs, and subsequent bronchoscopy showed a practically normal bronchus.

In a recent report [12] commenting on the satisfactory application of close cooperation between the internist, roentgenologist, pathologist and bronchoscopist in arriving at a diagnosis in cases presenting obscure signs in the chest, I stated my conclusions that bronchoscopy as a diagnostic aid is supplementary to complete clinical and radiographic studies; that bronchoscopy is indicated in all cases of pulmonary disease in which there is a diagnostic question after physical examination, and after roentgen-ray and laboratory studies have been carried out; and that bronchoscopy may be of aid in diagnosis in any patient with pulmonary disease in whose sputum tubercle bacilli cannot be found. I further believe that bronchoscopy should be performed in any case of obscure pulmonary disease, provided definite contraindications are not present.

Bronchoscopy in Asthma.—The presence of an asthmatoid wheeze, heard at the open mouth, associated with paroxysms of coughing, and clinical symptoms commonly observed in asthma are insufficient to warrant a positive diagnosis of that curious entity. Jackson [18] reports thirty-seven cases of the occurrence of foreign bodies in the air and food passages of children in whom the condition had been erroneously diagnosed as asthma. He concurs with many internists and pediatricians that a diagnosis of asthma should not be made in a child without

20. Jesberg, S.: Bronchoscopic Studies of Some Conditions of the Respiratory Tract, Ann. Otol. Rhin. and Laryng. **35**:905 (Sept.) 1926.

excluding by every means available the presence of a foreign body as a diagnostic possibility.

Kern [21] believes that bronchoscopy is a valuable aid in the study of asthma. Finding of the typical pallid, swollen mucosa of asthma by bronchoscopy often gives a clue to the etiology in cases of obscure chronic cough. If autogenous vaccine is to be utilized in the treatment of these cases, the uncontaminated specimens of secretions are readily obtained by bronchoscopy.

LUNG SUPPURATION

Post-tonsillectomic Lung Abscess.—New data have not been presented to explain the mode of infection of the lung in the production of abscess of the lung, complicating tonsillectomy. In experimental studies on lower animals, definite pulmonary abscesses were produced by the introduction of infected emboli into the circulation through the jugular vein (Chandler, Holman, Weidlein, Schlueter). These observations support the embolic theory (Fetterolf and Fox). Aspiration of infected secretion, blood or particles into the bronchi is insufficient to produce suppuration (Myerson). Jackson believes that the most important factor in the development of pulmonary abscess, when infection has reached the lung by aspiration, is failure of the defensive powers of the lung; namely, the cough reflex, ciliary activity and the normal germicidal action. Myerson agrees with the foregoing; he contends that it is not aspiration that influences the production of an abscess on the lungs, but rather the inability of a given portion of the lung to rid itself of infected material.

The proper treatment to be carried out can best be determined by the cooperation of internist, roentgenologist, surgeon and bronchoscopist.

Jackson [22] considers bronchoscopic aspiration a valuable addition to methods of treatment, as being the most direct method of treating post-tonsillectomic suppuration of the lungs. He believes that it should not be used to the exclusion of treatment by the pediatrician or internist, nor should it be used in cases in which the pediatrician, internist and surgeon consider that external operation is indicated. He agrees with Willy Meyer that bronchoscopic aspiration is especially indicated at the onset of pulmonary symptoms. Although aspiration of pus is the first consideration in the bronchoscopic treatment in these cases, Jackson believes that the direct application of medication through the bronchoscope shortens more or less the time in which favorable results are obtained.

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21. Kern, R. A.: Problems in the Diagnosis and Treatment of Bronchial Asthma and Hay Fever, Atlantic M. J. **29**:334 (June) 1926.

22. Jackson, C.: Post-Tonsillectomic Pulmonary Abscess, Atlantic M. J. **29**:309 (Feb.) 1926.

Myerson [23] reports a series of fifteen cases of pulmonary abscess complicating tonsillectomy, and observed that, although a fair percentage of these patients recover spontaneously, if bronchoscopic treatment were used, the number of cures would be far greater, and the duration of the illness would be appreciably shortened; furthermore, there would probably be fewer cases of chronic lung suppuration. In cases of long standing with bronchial dilatation and extensive pulmonary fibrosis, bronchoscopy will add to the patient's comfort by lessening the frequency of cough and reducing the quantity of expectoration.

Tucker's [24] results in the treatment of a large number of patients with suppuration of the lungs lead him to believe that the sooner bronchoscopy is performed, particularly in cases due to aspirated infection, the more promptly will beneficial results be obtained.

Lukens [25] agrees that the success of bronchoscopic drainage in suppuration of the lungs depends to a great degree on the promptness with which a correct diagnosis is made, and bronchoscopic treatment instituted. In his experience, the solitary abscess involving the right lung or the left upper lobe responds best to bronchoscopic treatment, while an abscess of the left lower lobe or multiple abscesses, regardless of situation, give poor results.

In their observations on the treatment of abscess of the lungs, Miller and Lambert [26] do not consider bronchoscopy as the most important method; they have, however, considerably modified their previous views, and now believe that bronchoscopic aspiration may in many cases facilitate drainage when it is not promptly established by rest and by postural means. The possible dangers and discomforts can be eliminated only if the procedures are carried out by a skilful operator. In their experience early aspiration in certain acute cases has been followed by prompt cure, but they emphasize the importance of rest and posture as fundamental, and the bronchoscope as an useful adjuvant to this treatment to establish more prompt and direct drainage. They consider the passage of the tube combined with suction as the most important, while lavage and the use of medicaments are practically without value. They conclude that the successful treatment of patients with abscess of the lung is materially aided by the cooperation of internist and surgeon with a skilled bronchoscopist.

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23. Myerson, M. C.: The Bronchoscopic Treatment of Lung Suppuration with Special Reference to the Post-Tonsillectomy Type, Laryngoscope **36**:356 (May) 1926.

24. Tucker, G.: Recent Developments in Peroral Endoscopy, Surg. Gynec. Obst. **62**:743 (June) 1926.

25. Lukens, R. M.: Bronchoscopy as an Aid in the Diagnosis and Treatment of Suppurative Diseases of the Lung, Colorado Med. **23**:78 (March) 1926.

26. Miller, J. A., and Lambert, A. V. S.: The Treatment of Abscess of the Lung, Am. J. M. Sc. **171**:81 (Jan.) 1926.

Orton and Barkhorn [27] report excellent results by bronchoscopic aspiration in suppuration of the lung, and report a case of abscess of the right lower lobe in which the patient made a remarkable recovery after the second bronchoscopy. Miller [28] reports excellent results with bronchoscopy, and describes a case of extensive suppuration following what was probably pneumonia. Seven bronchoscopic aspirations were performed, with remarkable improvement. In order to facilitate fibrosis of the involved area, deep roentgen-ray therapy was carried out, with apparently beneficial results.

It is generally recognized that treatment of patients who have suppuration of the lung by bronchoscopy should not be carried out independently by the bronchoscopist alone (Jackson) and that not every case should be treated indefinitely. Tucker [29] observes that under bronchoscopic treatment many patients improve, many are cured, but none are made worse. In certain cases the progress of the disease has not been arrested, and in a few of these there has occurred a more definite localization of the abscess which renders it accessible to external drainage. He agrees that it would be a mistake to undertake independently the bronchoscopic treatment of suppuration of the lung, believing that the best results can be obtained by close cooperation of the internist, roentgenologist, surgeon and bronchoscopist.

Bronchoscopy in Membranous Tracheobronchitis.—It is a well known fact that there is a high mortality in tracheobronchial diphtheria. This is due to delay in diagnosis and also to nonrecognition of the bronchial obstruction caused by membrane, crusts and secretion so commonly observed in these cases. This should recall the noteworthy fact that Pasteur's early observations on massive collapse of the lungs were made on this type of case.

It is interesting to note that Boelinger [30] advises mechanical removal of the obstructing membrane by laryngoscopy and bronchoscopy. He has used the Jackson 4 mm. bronchoscope combined with suction, and finds that this method is not difficult or painful. He believes that the use of a small instrument causes less traumatism.

Gittins [31] has found it necessary to resort to bronchoscopy for the removal of obstructing masses of crusts and secretion in cases of non-

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27. Orton, H. B., and Barkhorn, H.: Bronchoscopy for Lung Abscess, S. Clin. N. Amer. **7**:1529 (Dec.) 1926.

28. Miller, J. W.: Extensive Lung Abscess Involving the Entire Right Lower Lobe, Arch. Otolaryng. **4**:334 (Oct.) 1926.

29. Tucker, G.: Symposium on Lung Abscess, Am. J. Roentgenol. **15**:407 (May) 1926.

30. Boelinger, M. P.: Tracheobronchial Diphtheria, New Orleans M. & S. J. **78**:142 (Aug.) 1925.

31. Gittins, T. R.: Membranous Laryngitis and Tracheobronchitis, Ann. Otol., Rhin. & Laryng. **35**:1110 (Dec.) 1926.

diphtheritic membranous tracheobronchitis. He agrees that the serious symptoms are probably due to mechanical obstruction of the airway, rather than to toxemia.

Bronchoscopic Aid in Tracheotomy.—In certain cases of dyspnea requiring tracheotomy, this operation presents hazards which may greatly militate against a successful result. Lewis [32] cites the case of a child, aged 5 months, who presented alarming signs of obstructive laryngeal dyspnea. There was a large suppurating area on the left side of the neck with extensive edema of the surrounding tissues. Immediate tracheotomy was indicated, but because of the extensive suppuration with edema and obliteration of all landmarks, the operation presented unusual difficulties. A bronchoscope was therefore inserted through the edematous larynx into the trachea, and tracheotomy was proceeded with in an orderly manner. Lewis concludes that this method is of value as an aid to tracheotomy in those cases in which the trachea is completely hidden and deviated from its normal position by such conditions as carcinoma, greatly enlarged thyroid gland, enlarged thymus gland or extensive suppurative conditions. Tucker [24] reports a similar experience in a man, aged 65, who suffered from severe dyspnea, the result of malignant disease of the thyroid. There was a bilateral recurrent paralysis of the larynx. On insertion of the bronchoscope, a large fungating mass was found in the trachea. Great difficulty was experienced in locating the trachea, because of the carcinomatous infiltration which displaced it to the left. In a second case there was a compression stenosis of the trachea and left bronchus produced by a lymphosarcoma of the mediastinum. With the bronchoscope in position, tracheotomy was performed, and a Jackson cane-shaped cannula inserted to the level of the orifice of the right main bronchus, which seemed patulous.

FOREIGN BODIES IN THE AIR AND FOOD PASSAGES

The outstanding features of bronchoscopy and esophagoscopy in the removal of foreign bodies, according to Milligan,[33] is the remarkable lowering of the mortality rate. Prior to endoscopy, the death rate due to the impaction of foreign bodies in the esophagus was from 20 to 40 per cent, while now, when the esophagoscope is used in skilful hands, the rate does not exceed 2 or 3 per cent. In the prebronchoscopic days, the mortality rate of tracheobronchial foreign bodies exceeded 50 per cent, and now it has been remarkably lowered. Expert radiography has

32. Lewis, F. O.: The Bronchoscope as an Invaluable Aid for the Performance of Tracheotomy in a Certain Class of Cases, Laryngoscope **36**:204 (March) 1926.

33. Milligan, Sir W.: Foreign Bodies Impacted in the Food and Air Passages; Modern Technique in Their Diagnosis and Treatment, Lancet **1**:111 (Jan. 16) 1926.

added much in work relating to obstruction by a foreign body, both in accurate localization and in furnishing data for the solution of the problems of successful removal. He condemns the practices of digital manipulation, inverting the patient and blind methods of instrumentation.

To me it seems that the most remarkable developments in peroral endoscopy for foreign bodies are: the universal recognition of bronchoscopy and esophagoscopy as the only methods to be considered in the removal of foreign bodies from the air and food passages; the appearance of reports in the literature of practically every land, of cases of obstruction by foreign bodies, which have been correctly diagnosed and in which the foreign body has been successfully removed, and a universal recognition of the occurrence of nonopaque foreign bodies in the air passages. This brings to mind the fact that every quarter of the globe has contributed cases in which the foreign body was a peanut. While it is true that nowhere is the peanut such a commonly observed tracheobronchial foreign body as in the United States, it is also true that the peanut is a common article of diet in this country. In China, Matsui (1923) read the first report on the successful bronchoscopic and esophagoscopic removal of foreign bodies from the air and food passages. Dunlap, of Peking, reported in 1925 a case of bronchitis caused by a peanut occurring in a Chinese boy, aged 5 years. Matsui [34] reports a group of cases of foreign bodies in the air passages, four of which were of vegetal origin. These were successfully removed, and the patients recovered. Curiously, three of these patients were less than 2½ years of age.

On account of the fact that in China a large part of the population is not in touch with scientific medical attention, many cases are now probably overlooked, just as cases of bronchial foreign bodies were overlooked in every land before the advent of bronchoscopy and roentgenology.

In a report of cases of foreign bodies in the air passages, Wiskovsky [35] (Czecho-Slovakia) includes sixteen cases of vegetal substances, among which were five beans, two nuts and one grain of corn. In nine instances the foreign body was found in the right bronchus.

In point of frequency one usually observes more cases of esophageal than of tracheobronchial obstruction by foreign bodies. In Gittins' [36] experience, covering forty-three cases, there were twenty-eight in which

34. Matsui, T.: The Problems of Tracheobronchoscopy and Esophagoscopy, China M. J. **40**:646 (July) 1926.

35. Wiskovsky, B.: Contribution to the Study of Foreign Bodies in the Air Passages, Arch. internat. de laryngol., otol., rhinol. and Br. Esoph. **5**:1062 (Nov.) 1926.

36. Gittins, T. R.: Foreign Bodies in the Air and Food Passages, J. Iowa M. Soc. **15**:532 (Oct.) 1925.

obstructions were found in the air passages, and, curiously, all were non-opaque to the roentgen ray. Of the twenty-eight, all but four were of vegetal origin, eight corn kernels, four peanuts and four sandburrs. The relative proportion of grains of corn in this series of cases recalls the predominance of certain types of foreign bodies in certain localities, so that one might consider corn kernels as peculiar to the corn-growing belt, and so on.

On the other hand, Knauer,[37] who reports a group of thirty-two cases of obstruction by foreign bodies finds seven sandburrs among thirteen vegetal foreign bodies. This high proportion of sandburrs bears out Taylor's observation regarding their frequency in the southeastern part of the United States.

White [38] reports an interesting series of cases of obstruction by foreign bodies which include a number of cases in which the foreign body was of vegetal origin. In two of these, the objects were grass burrs, which had lodged in the trachea immediately above the bifurcation. Removal was successfully accomplished, with complete recovery of the patients.

Hays [39] reports an interesting case of obstruction of the bronchus by a vegetal foreign body, in which the initial symptoms were ignored, and later diphtheria antitoxin was administered in the belief that diphtheria had developed. Hays elicited a history of choking while the child was playing with watermelon seeds, and subsequently removed the foreign body by bronchoscopy.

Foreign bodies of vegetal origin are usually associated with a severe local and systemic reaction when inspirated into the air passages of young children.

Myers [40] reports four cases of obstruction by vegetal foreign bodies occurring in young children and associated with severe local and constitutional reaction.

Richards [41] reports the case of a child, aged 3½ years, with a grain of corn in the bronchus. On the third day after the accidental aspiration, the patient's temperature was 105 F. At bronchoscopy a large quantity of mucopurulent secretion was found, which added greatly to

37. Knauer, W. J.: Foreign Bodies in the Food and Air Passages, J. Florida M. A. **13**:17 (July) 1926.

38. White, W. B.: Tracheobronchoesophagoscopy, M. J. & Record **124**:241 (Feb. 3) 1926.

39. Hays, C. E.: Removal of Watermelon Seed from Right Bronchus of a Child, Atlantic M. J. **29**:461 (April) 1926.

40. Myers, E. L.: Foreign Bodies in the Air and Food Passages with Especial Reference to Those not Casting X-ray Shadows, Illinois M. J. **49**:281 (March) 1926.

41. Richards, L.: A Corn Kernel in the Bronchus, Boston M. & S. J. **194**: 57 (Jan. 14) 1926.

the difficulties of bronchoscopy. Following removal of the foreign body, aspiration of secretion through the tracheotomic cannula was required at frequent intervals.

Kernan [42] calls attention to the seriousness of the reaction following aspiration of the peanut. He reports eight cases, and says that all these patients do not die; if the patient survives, there is usually extensive lung destruction.

Subcutaneous emphysema complicating the presence of a foreign body in the air passages has been observed (Jackson). Forbes [43] reports the presence of subcutaneous emphysema, involving the neck and upper part of the chest anteriorly, occurring in the case of a child who had aspirated a nut three days before. Roentgen-ray studies revealed an emphysematous condition of the lower right side. Instrumentation had not been carried out previously. Following the bronchoscopic removal of the foreign body, a stormy convalescence ensued, which ended in complete recovery. Forbes believes that there was a rupture of a small pulmonary vesicle, with the subsequent leakage of air into the mediastinum and tissues of the neck. A similar case of emphysema was reported by Woodward,[44] occurring in the case of a child, aged 6 years, who had choked on a grain of corn. Following the bronchoscopic removal of the foreign body, tracheotomy became necessary because of profuse thick secretion which could not be coughed up. The patient made a complete recovery.

With the progress that has been made in roentgenologic diagnosis, the bronchoscopist must always turn to the roentgenologist for assistance. According to Manges,[45] the roentgen-ray diagnosis and localization of a nonopaque foreign body in the bronchus can be made with the same degree of certainty and accuracy as in the case of the opaque foreign body. If the object is lodged in the trachea, repeated examinations may be necessary; these will reveal positive observations in all but a small percentage of such cases, a small group in which trouble is caused by foreign bodies of such shape and size as will not cause expiratory obstruction. In the latter cases, the foreign body is usually freely movable in the trachea, and can be readily diagnosed from the symptoms and physical signs. The changes occurring in the lungs in the presence of nonopaque foreign bodies are of four distinct types,

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42. Kernan, J. D.: The Reaction of the Lung to the Aspirated Peanut, Laryngoscope **36**:823 (Nov.) 1926.

43. Forbes, H. H.: Report of Case of Emphysema of the Neck and Chest (Preoperative) Following Inhalation of a Piece of Nut, Laryngoscope **36**:192 (March) 1926.

44. Woodward, F. D.: Report on Year's Work in Endoscopy, Virginia M. Monthly **53**:299 (Aug.) 1926.

45. Manges, W. F.: Nonopaque Foreign Bodies in the Air Passages. X-ray Diagnosis and Localization, Brit. J. Radiol. **31**:119 (April) 1926.

namely, obstructive emphysema, atelectasis, drowned lung and lung abscess. Manges gives a detailed description of these changes and of the roentgenographic technic employed in the examinations, and exhibits an excellent series of illustrations setting forth the various roentgen-ray phases of his observations.

An interesting observation is recorded by Carpenter [46] in cases of obstruction by foreign bodies (presumably bronchial?). There seemed to be little respiratory movement of the chest, the patient refusing to breathe deeply or cough. He believes it is an effort on the part of the patient to avoid dislodging the foreign body, thereby preventing paroxysms of severe and prolonged coughing.

Stiles [47] records two cases of obstruction by a foreign body in the larynx, which illustrate the importance of routine roentgen-ray examinations in the presence of respiratory tract symptoms. In one case slight hoarseness and tenderness were noticed over the front of the neck, following a slight injury. A routine roentgen-ray study revealed a common pin in the larynx. History of having a pin in the mouth could not be elicited. The second case was that of a child, aged 6 months, who developed a cough and rapid, noisy respiration with dyspnea and fever. Roentgen-ray examination revealed a short iron bolt in the larynx.

In a report of cases of unsuspected foreign bodies, Seydell [48] discusses the question from the standpoint of diagnosis and observes that, although more of these cases are now being recognized early, there remains a considerable number that have been overlooked for varying periods of time. He emphasizes the importance of remembering that, although certain initial symptoms are often observed at the time of the accident, it is possible for a foreign body to enter the air or food passages without causing any symptoms at the time. He suggests that clinicians keep in mind that any hoarseness, cough, dyspnea, difficulty in swallowing or an unaccountable loss of weight in an infant, may mean a foreign body in the air or food passages.

Now and again the bronchoscopist is confronted with problems in the removal of a foreign body which tax his ingenuity to the utmost. Patterson [49] recounts her experiences with beads in the bronchi, and reports a recent case of a bead in the right bronchus of a child, aged

46. Carpenter, E. W.: Disease and Foreign Bodies in the Air and Food Passages, J. S. Carolina M. A. **22**:27 (Feb.) 1926.

47. Stiles, P.: Two Cases of Unsuspected Foreign Body in the Larynx, Laryngoscope **35**:931 (Dec.) 1925.

48. Seydell, E. M.: Foreign Bodies in the Air and Food Passages with Case Reports of Unsuspected Foreign Bodies, J. Kansas M. Soc. **26**:220 (July) 1926.

49. Patterson, Ellen J.: Beads as Foreign Bodies in the Bronchi. Mechanical Problems Presented and Their Solution, Ann. Otol. Rhin. and Laryng. **35**:989 (Dec.) 1926.

4 years. The problem of removal was ultimately solved by using the Tucker bead forceps. Patterson stresses the question of prophylaxis, and concludes that these accidents could be eliminated by prophylactic propaganda. Glass beads produce little reaction. The reaction is largely dependent on whether or not the bead is obstructing a bronchus or is loose in the trachea. She observes that each bead problem should be worked out on a manikin before attempting removal from the living patient, and that a secure grasp can be maintained only by applying the blades of the forceps beyond the equator in spherical beads, and beyond the minor axis of the ellipsoid in the case of pyriform or oval beads.

The frequency of certain dental accidents causing obstruction by foreign bodies prompted Jackson [50] and others to call attention again to these occurrences and to a means for their prevention. Eight cases of root canal broaches in the bronchi have been observed. All the patients were adults, and in nearly all the cases a molar tooth was being dealt with. Ill effects were not observed in any case, either from the sojourn of the broach or from the bronchoscopy by which it was removed. The basic causative factor in these accidents seems to be the instrument itself; secondary factors are the manner of use between the tips of the thumb and finger and the sudden jumping movement of the patient, due to pain. Whenever any dental object is lost or missing, the first thing to do is to order a roentgen-ray examination of the air and food passages of the patient. This will avoid subsequent legal difficulties, and will also give positive information regarding the presence or absence of a foreign body. If the foreign body is in the alimentary canal, it should be observed daily by a roentgenologist. If it is in the esophagus or tracheobronchial tree, it can be safely and quickly removed by esophagoscopy or bronchoscopy. Any other procedure is not worthy of consideration.

The striking contrast in the progress of pulmonary suppuration due to the presence of a foreign body in the bronchus, and that occurring as a complication of an infectious disease or an operation, leads Jackson [51] to raise the question whether there is a natural barrier to infective invasion of the lung by way of the bronchus. He concludes that pulmonary suppuration, starting endobronchially as a result of the presence of a foreign body, is a mild, slow and restricted process as compared with embolic, postpneumonic and postinfluenzal suppurations, and manifests such a tendency toward prompt and complete recovery after removal of the foreign body as to suggest the presence of some kind of physio-

50. Jackson, C.; Tucker, G., and Clerf, L. H.: Root-Canal Broaches in the Lungs, Dental Cosmos **68**:449 (May) 1926.

51. Jackson, C.: Suppurative Diseases of the Lung due to Aspirated Foreign Body Contrasted with those of other Etiology, Surg. Gynec. Obst. **42**:305 (March) 1926.

logic or structural barrier against the invasion of suppurative processes by the endobronchial route. These characteristics of suppuration caused by foreign bodies are most marked in cases of metallic foreign bodies, which seem to possess germicidal powers. Minus the germicidal powers, these characteristics are present to a less degree in cases of other kinds of foreign bodies. They are least apparent in cases of vegetable foreign bodies; but even in these, the prompt recovery which almost always occurs if the foreign body has not been long in the tracheobronchial tree is in marked contrast to the course of suppuration of the lung due to any other cause than the presence of a foreign body. Complete recovery in a large series of cases of suppuration caused by the presence of foreign bodies of from ten to thirty-six years' duration, with no other treatment than the removal of the foreign body, is so different from the course of pulmonary suppuration due to other cases as to call for a separate classification of suppurations produced by endobronchial foreign bodies.

From the standpoint of the roentgenologist, certain pulmonary changes are observed, following the prolonged sojourn of bronchial foreign bodies. Manges [52] reviews the roentgen-ray observations in a large number of these cases, and concludes that an aspirated foreign body in any portion of the tracheobronchial tree will sooner or later cause extensive permanent injury. There is great variation as to the length of time a foreign body may be present before causing extensive changes, but those that interfere with drainage cause injury early, as a rule. The permanent pathologic change is distal to the point at which drainage is blocked. The foreign body is at or distal to this point. The end-results are in the nature of atelectasis, fibrosis, bronchiectasis and chronic abscess, with varying quantities of purulent exudate. Hemorrhage is common; tuberculosis is often suspected, but is rarely present. The other lung remains remarkably free from pathologic change. He believes that many of the one-sided, chronic, basal infections are the result of the presence of a foreign body, regardless of history or of roentgenographic shadow of a foreign body, and that such lesions should at least be investigated bronchoscopically, and many should be treated in this manner.

Among the changes observed after a prolonged sojourn of a bronchial foreign body was the presence of a cicatricial stricture of the bronchus occurring proximal to a large bar pin, which had been in the right bronchus of a child, aged 10 years, for more than three years. Imperatori [53] experienced little difficulty in removing the pin after

52. Manges, W. F.: Pathologic Changes in Lung Tissue as the Result of Foreign Bodies of Long Sojourn, J. A. M. A. **87**:987 (Sept. 25) 1926.

53. Imperatori, C. J.: Foreign Body Removed from Bronchus after being in Situ over Three Years, Laryngoscope **36**:202 (March) 1926.

dilatation of the stricture. The patient made an uneventful recovery. Another remarkable case reported by Imperatori [54] demonstrates the advantages to be gained by diagnostic bronchoscopy, on the one hand, and the curious reactions of the body tissues, on the other. The patient made a fair recovery following a thoracotomy for empyema, but about one year afterward the wound broke down, and a piece of gauze was removed. He subsequently developed a severe cough, and lost considerable weight and strength. Roentgen-ray studies revealed a pathologic area which suggested the possibility of foreign body. Bronchoscopy was performed, and a piece of gauze about 8 inches long was removed from one of the bronchial subdivisions. The patient ultimately made a complete recovery.

Close cooperation between the endoscopist and roentgenologist are imperative. In a presentation of clinical cases, Tucker [55] points out certain phases of the assistance that may be furnished by the roentgenologist in diseases of the esophagus and bronchi and in the localization of foreign bodies in the air and food passages.

Foreign Bodies in the Esophagus.—Syme's [56] observations corroborate the observations of other esophagoscopists, namely, that foreign bodies are more commonly observed in the food passages than in the air passages. He finds that coins are most frequently observed on Sundays, due to the fact that children are often given a "Saturday penny." He reports the removal from the esophagus of a hypodermic needle which had been lost during the injection of procaine hydrochloride solution, preliminary to tonsillectomy.

McReynolds [57] reports the removal of an enormous denture from the upper esophagus in the case of an adult who disclaimed any knowledge of swallowing his teeth, although they had been lost. The plate was in the esophagus for thirty-three days, and, although producing marked dysphagia with some huskiness and dyspnea, the patient did not suffer during the entire time. The Jackson adult laryngoscope was used in the removal.

Yankauer [58] cites the case of a woman, the victim of melancholia, who swallowed thirteen foreign bodies with suicidal intent. Roentgen-ray studies revealed foreign bodies in the esophagus as well as in the

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54. Imperatori, C. J.: Foreign Body Introduced Transpleurally and Removed via Bronchus Three Years Later, Laryngoscope **36**:200 (March) 1926.

55. Tucker, G.: Roentgenologic Aid to the Bronchoscopist, Arch. Phys. Therapy, X-ray & Rad. **7**:571 (Oct.) 1925.

56. Syme, W. S.: Endoscopy and the Removal of Foreign Bodies from the Air Passages and Upper Food Passages, Glasgow M. J. **106**:310 (Nov.) 1926.

57. McReynolds, G. S.: Full Upper Tooth Plate Removed from the Esophagus, J. A. M. A. **87**:407 (Aug. 7) 1926.

58. Yankauer, S.: Thirteen Foreign Bodies Removed from the Esophagus at One Sitting, Arch. Surg. **12**:447 (Jan.) 1926.

stomach and intestines. The foreign bodies removed included hairpins, nail, screw, needle, safety pin and several pieces of glass and crockery. With one exception, all of these objects were lodged above the aortic constriction, and all were successfully removed at one sitting. In dealing with an interesting group of cases of esophageal foreign bodies, including a pecan nut, numerous coins, and several jackstones, I [59] concluded that initial symptoms of choking and gagging should always indicate the possibility of the presence of a foreign body, and call for its exclusion. Roentgen-ray studies for a foreign body in the alimentary canal should include the entire food passages, from the nasopharynx to the terminal portion of the rectum, inclusive. In cases of nonopaque foreign bodies in the esophagus, the roentgenologist cannot give a definite opinion until he has used a radiopaque material, either in a capsule or as a mixture. To be of value in solving mechanical problems, roentgenograms should be made in the anteroposterior and in the lateral positions (the latter at right angles to the former). In addition to these, the roentgenologist should make films which show the greatest plane of the foreign body. I believe that every patient suffering with dyspnea of unknown etiology should be examined with the roentgen ray to rule out, among other things, the presence of an esophageal foreign body, and that persistence of symptoms referable to the esophagus in the presence of negative roentgen-ray observations calls for a diagnostic esophagoscopy.

Bishop [60] reports an interesting case of finding a safety pin in the esophagus of an infant, aged 4½ months. This was an actual accident and not the result of carelessness, as is usually the case.

The common symptom of esophageal foreign bodies is dysphagia. Occasionally cases are observed in which the outstanding symptoms and signs are referable to the respiratory tract (Jackson), and in these the foreign body is frequently overlooked, especially if nonopaque to the roentgen ray. Four instructive cases of esophageal foreign body with respiratory symptoms are reported by Naftzger and Gittins.[61] In one case the patient was treated for stomach trouble because of difficulty in swallowing coarse foods. Because of certain respiratory symptoms, a diagnosis of asthma and bronchitis was then made. Later the tonsils and adenoids were removed to relieve the dysphagia and respiratory symptoms. After the patient had been treated by three physicians for

59. Clerf, L. H.: Foreign Bodies in the Esophagus, Ann. Otol., Rhin. and Laryngol. **35**:1000 (Dec.) 1926.

60. Bishop, J. J.: Open Safety Pin in Esophagus of an Infant Four and a Half Months Old, Atlantic M. J. **29**:661 (June) 1926.

61. Naftzger, J. B., and Gittins, T. R.: Foreign Bodies in the Esophagus with Respiratory Symptoms Complicating Diagnosis, Laryngoscope **36**:370 (May) 1926.

eight months, a roentgenogram of the chest was made, which revealed a metallic foreign body in the esophagus.

Perforation of the esophagus with suppurative mediastinitis was reported by Orton [62] in the case of a child who had swallowed a needle with thread attached. A member of the family, seeing the thread hanging from the patient's mouth, pulled on it. From this and the fact that the needle was point uppermost, it is probable that it was swallowed with the eye extremity foremost and, when the thread was pulled, the point perforated the esophageal wall.

Safety pins as foreign bodies present mechanical problems that vary widely from the easy to the difficult, according to Jackson.[63] He advises that the first step toward the solution of the problem presented should be to obtain a duplicate of the particular pin by matching with the roentgenogram, and that many hours of practice be carried out, using the open manikin board, rubber tube, cadaver and the dog. Forceps should be carefully tested and adjusted. Sixteen fundamental methods of dealing with the safety pin lodged point upward are considered. Four of these involved mutilation of the pin, and are not often used. The twelve preferable methods have as their objects version of the pin so that the point will trail, sheathing of the point or of both ends in the tube mouth, closure of the pin, straightening it or allowing it to dangle.

The removal of an animate foreign body from the air or food passages would undoubtedly be a rare accomplishment in the experience of any bronchoscopist. In an exhaustive review of the literature, Gudger [64] has collected from widely separated and obscure sources, accounts of the lodgment of live fishes in the air and food passages. In none of the cases reported was an attempt made to remove the intruder by endoscopic means.

Considerable interest should be attached to the remarkable work along endoscopic lines that is being performed on dogs and cats. A symptomatology and methods of diagnosis for cases of obstruction by foreign bodies for dogs and cats have been outlined by Horning and McKee,[65] who report a number of successful removals of foreign objects from the air and food passages of these animals.

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62. Orton, H. B.: Traumatic Perforation of the Esophagus, Laryngoscope **36**:183 (March) 1926.

63. Jackson, C.: Bronchoscopic Removal of Safety Pins, Arch. Otolaryng. **3**:423 (May) 1926.

64. Gudger, E. W.: Live Fishes Impacted in Food and Air Passages of Man, Arch. Path. **2**:355 (Sept.) 1926.

65. Horning, J. G., and McKee, A. J.: Laryngoscopy, Bronchoscopy, Esophagoscopy and Gastroscopy in Dog and Cat Practice, Veterinary Med. (Jan). 1926.

A striking case of esophageal foreign body in a dog was reported by Krumbhaar and Tucker.[66] For two weeks the dog would immediately vomit (?) practically everything as soon as eaten. A roentgenogram taken of the animal's thorax revealed a large cuboidal mass, presumably a bone, in the lower third of the esophagus. This was removed by esophagoscopy under morphine narcosis, and the animal made an excellent recovery.

Historical Review.—A complete and thorough presentation of the history of bronchoscopy and esophagoscopy for foreign body, with an extensive bibliography and a historical survey of peroral endoscopy, have been contributed by Patterson,[67] and by Moore.[68] Space does not permit a review of either of these interesting articles which, to be appreciated, must be read in the original.

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66. Krumbhaar, E. B. and Tucker, G.: Successful Removal of Obstructing Bone from a Dog's Esophagus by Means of the Esophagoscope, J. Am. Veterinary M. A. **70**:379 (Dec.) 1926.

67. Patterson, E. J.: History of Bronchoscopy and Esophagoscopy for Foreign Body, Laryngoscope **36**:157 (March) 1926.

68. Moore, I.: Historical Survey of Peroral Endoscopy, J. Laryngol. and Otol. **41**:277 (May) 1926; cont. **41**:361 (June) 1926.

Abstracts from Current Literature

Ear

TECHNIC OF VIBRATORY MASSAGE OF THE TYMPANUM THROUGH THE EUSTACHIAN TUBE. D. VASILIU, Arch. internat. de laryngol. otol. rhinol. **5**:996 (Sept.-Oct.) 1926.

The author reviews the anatomy of the middle and internal ear and discusses the physiology of hearing.

External vibratory massage does not influence very much either the movements of the tympanum on account of its retraction and concavity, nor a distribution of the elevation of tension in the tympanic cavity nor the movements of the ossicles.

In a new method of giving massage, the two tubes of Delstanche is used. One tube is introduced through the nose into the eustachian orifice; when the operator has been convinced that the inflation reaches the middle ear satisfactorily, the other tube is introduced into the external auditory canal, and massage is carried on for fifteen minutes.

The theoretical and practical advantages of this method are: Massage applied to the convexity of the tympanic membrane is more effective than when applied to the concavity. By this method, massage is applied directly to the ossicles and the muscles; this direct association with the electrical current may cause complete recovery of function in cases of greatly impaired hearing of the catarrhal type. The massage may be applied directly to the secondary tympanum. This method is superior to the method of Politzer, and there is less danger of causing tympanic performation or emphysema of the mucosa.

A CASE OF UNILATERAL DEAFNESS FOLLOWING RADIOTHERAPY. JOERGEN MOELLER, Arch. internat. de laryngol. otol. rhinol. **5**:1088 (Nov.) 1926.

A man, aged 74, who had complained for years of a slight impairment of hearing, on April 19 and June 8, 1920, was treated at the Institute of Radiotherapy in Copenhagen for an epithelioma on the right side of the nose. He was seen by the aurist on August 4, when he gave a history of distressing vertigo and nausea following the first treatment, and a severe tinnitus. He thought that he had been completely deaf in the right ear for fifteen days. Examination showed that the drum heads were normal. Bone and air conduction in the left ear were practically normal; in the right ear, doubtful. The patient said that he heard the forks, Galton whistle, monochord, etc., with the left ear. Rotation to the right showed nystagmus to the left, 25 seconds. Rotation to the left showed nystagmus to the right, 5 seconds. Caloric test, cold, of the right ear, 25 to 30 seconds, showed marked nystagmus to the left, 2 minutes and 30 seconds.

The author believes that the patient may have had an old catarrhal condition of the right ear, as his history indicated; however, he thinks that the radiations caused a complete abolition of the function of the acoustic ear, but that there was a regressive course, as far as the function of the static ear was concerned. The author cites the experiments of Marx, who exposed pigeons to radiations. A histologic examination of the pigeons six months

later showed a destruction of the crista, macula and the organ of Corti. The author believes that radiations to regions near the ears must be regarded as dangerous to the labyrinth.

ROTH, Kankakee, Ill.

OTOLITH FUNCTION IN AMPHIBIA AND FISH. H. L. CHILOW, Ztschr. f. Hals-, Nasen- u. Ohrenh. **16**:452 (Oct. 14) 1926.

Breuer was the first to differentiate the function of the otolith apparatus from that of the semicircular canals. The work of Magnus, de Kleijn, Quix and their pupils opens broad fields for the study of the otolith apparatus. The stabile equilibrium of the body is dependent on the position of the center of gravity on a vertical line. A change of position of the center of gravity produces a labile position, a disturbance of equilibrium. The most highly developed animals do not possess a constant, but a labile center of gravity, which changes position when the animal moves. Various protective measures are called on, from the muscles, the eyes, tactile sensation and joints. The most active of these is the muscular system. The otolith apparatus is the agent between the position of the center of gravity and muscular activity. Magnus says that animals without an otolith apparatus, even when they cannot see, swim correctly. The center of gravity is stabile. From a biostatic point of view, living nature is divided into two groups, one with a stabile center of equilibrium without an otolith apparatus and one with a labile center of equilibrium with an otolith apparatus. Experimentally, some animals with a labile equilibrium can be changed into animals with a stabile equilibrium. Chilow experimented with frogs, tadpoles, tritons and fish.

Experiments with Frogs, Tadpoles and Tritons: The principal difficulty in the exclusion of the otolith apparatus is to avoid injuring the semicircular canals. The exclusion of the otolith apparatus is successful only in fish (Kabo, Benjamins and Maxwell). In mammals, de Bertel and Hofmann succeeded only recently in separating the sacculus otolith in rabbits, with the aid of the microscope. Wittmaack's method (to exclude the otolith apparatus) is the most efficient. By centrifugalization for a short time, the otoliths are torn from the nerve epithelium, while the cupulae of the semicircular canals remain intact. Chilow comes to the conclusion that in frogs the otolith apparatus is an organ which serves the animal to keep its normal position and not an organ of motion.

Tadpoles: Tadpoles with undeveloped extremities, with developed anterior extremities, and with all four extremities were used in the experiments. Centrifugalization disturbed the coordination of movements in young animals but not the position. In full-grown animals, however, disturbances of position are more prominent than disturbance of movements. In frogs the semicircular canals functioned ontogenetically sooner than the otolith apparatus. In tritons, as in frogs, the otolith apparatus is an organ of position.

Experimental Observations of the Otolith Function in Fish: The authors experimented with bastard carp (*Carassius vulgaris*), minnow (*Phoxinus laevis*) and smelt (*Osmerus eperlanus*). All these belong to the family of carp fish. Their hearing organ is a labyrinth developed from the ear-vesicle, which is built according to the water type, without the tympanic and resonatory organ. The labyrinth consists of three sacs: an oval sac, the utriculus, with three semicircular canals, a round sac, the sacculus, connected with the lagena, and the rudiment of the cochlea (the third sac). These sacs are filled with endolymph and contain otolith formations in the form of limestones, which rest on

the hairs of the nerve epithelium. By the method of conditioned reflexes, Frolow has proved that fish react to sound through neuromuscular motor reflexes, but these reflexes depend on the irritation of the tactile sense. The static function is attributed to the swimming bladder (Jaeger, Beletzki). Fish have two organs of equilibrium, the swimming bladder and the labyrinth, which are connected anatomically. Jaeger claims that the swimming bladder of carplike fish has two main functions, namely, changing the specific weight of the fish and the correlation of equilibrium.

Monoyer and J. Mueller, however, have observed that removal of the chest and abdominal fins caused the fish to assume a vertical position. The majority of authors acknowledge that the labyrinth and the swimming bladder serve to maintain equilibrium.

Chilow centrifugalized bastard carps, minnows and smelts and observed a loss of equilibrium and an increase in specific weight. He did not disturb the swimming bladder or the fins, but only caused the otolith apparatus not to function. The fish showed a disturbance of equilibrium and lost the faculty to adapt the size of the swimming bladder to various depths. They became heavier than the surrounding medium and sank like Jaeger's fish in which the swimming bladder was destroyed. The otolith apparatus sends a tonic impulse to the muscles of the body, which dilates the swimming bladder. When the function of the otoliths ceases, dilation becomes impossible, and the antagonists function. The swimming bladder is compressed, and the specific weight of the fish increases. It is possible that there exists a tonic influence of the otoliths on the smooth muscles of the bladder through the vagus nerve.

Chilow concludes that the otolith apparatus of fish is an organ of reflex of position, and that it is connected physiologically with the swimming bladder. The carplike fish which furnish the material for these observations live in shallow water. They cannot live on the ground of the deep seas, because the otolith apparatus is irritated by change of water pressure, and the swimming bladder becomes dilated by reflex action. One of the experiments may be cited from the article (experiment 12). A smelt was placed in a test tube, filled with water and closed hermetically. A capillary manometer was introduced through the cork. When the test tube was centrifugalized for half a minute, at the rate of 1,500 revolutions a minute, the level in the manometer sank. The exclusion of the function of the otolith caused the hypertonus of the constrictors, compression of the swimming bladder, decrease in volume, an increase of specific gravity in the fish, and the sinking of the level in the manometer.

AMBERG, Detroit.

Pharynx

GLYCEMIA IN ACUTE AND CHRONIC DISEASES OF THE TONSILS. ANTONIO GALLO. Arch. internat. de laryngol. otol. rhinol. **5**:917 (Sept.-Oct.) 1926.

Professor Vattunone is quoted as saying that a mechanical irritation of the tonsils causes an increase in the blood sugar. He believes that the tonsils secrete a hormone which influences the formation of blood sugar. His experiments were carried out on animals and not verified clinically.

Various researches were made by Scheier, Pugnat, Rossi, Marcelli, Caldera, Brunette and Comel. Their conclusions were that during a pharyngotonsillitis there is a transitory glycosuria; this glycosuria may be produced by irritation of the tonsils; extracts of bovine tonsils, properly prepared possess a more or less glycolytic action; extracts of bovine tonsils markedly influence the

glycosuric action of the suprarenals; the glycolytic action is more marked when the extract is injected intravenously.

The blood sugar was estimated according to the method of Cruto. The clinical researches were divided into two groups: The first was concerned with the blood sugar in acute and chronic tonsillar conditions and the second with blood sugar before and after operation.

The author comes to the conclusion that the acute infections in the first group are dependent on the parasympathetic system, favoring the intrahepatic glycogen or dependent on the sugar content received by way of the portal vein, which in turn stimulates the internal secretion of the pancreas. The trauma of operation in the second group increases the thrombokinase, causing a stimulation of the suprarenals and hypophysis, with a subsequent increase in the blood sugar.

SUBTOTAL TONSILLECTOMY. EMIL DARABAN, Arch. internat. de laryngol. otol. rhinol. **5**:1049 (Nov.) 1926.

Subtotal and complete tonsillectomies performed in the hospital Brancoveano are described. In children under 6 years of age, the tonsil was removed subtotally by the guillotine method. The crushing forceps of Ruault was applied for the removal of the tonsil in adults, under local anesthetic, after a dissection of the anterior and posterior pillars. Any fragments remaining were removed with a Hartman forceps. The author contends that the procedure is more rapid, and that less bleeding is encountered than by the American method.

INFERIOR RETROPHARYNGEAL ABSCESS IN A NURSLING. R. RENDU, Arch. internat. laryngol. otol. rhinol. **5**:1085 (Nov.) 1926.

An infant, 12 months old, had been sick for fifteen days with an ordinary infection of the head. A few days after the onset of the infection, the child had difficulty in swallowing and in respiration. The two symptoms increased until the dyspnea became alarming. Two physicians were called; one pronounced the condition angina, the other, bronchitis. When seen by the author, the child presented the appearance of profound infection and some emaciation. There was an extensive cervical adenitis on the right side. Opposite the base of the tongue on the posterior wall of the pharynx was a fluctuating mass, the size of a large nut. The child was removed to the hospital, where, in the Rose position, without anesthetic, the abscess was incised and strenuous suction immediately applied. Rapid recovery followed.

The author considers the inferior retropharyngeal abscess rare, but he believes that the operation is safe when the head is lowered and suction applied to the incision. He prefers this procedure to the external route, and does not think that there is any greater danger of aspiration pneumonia.

ROTH, Kankakee, Ill.

Larynx

PRIMARY TUBERCULOUS LARYNGITIS FOLLOWING BACILLAR SEPTICEMIA. HENRI CABOCHE, Arch. internat. de laryngol. otol. rhinol. et br.-esoph. **5**:1153 (Dec.) 1926.

Four months after a sudden acute infection diagnosed bacillar septicemia, a man, aged 36, complained of huskiness of the voice especially following his daily business talks. Laryngeal mirror examination showed two small vegetating growths, one on the anterior wall of the subglottic region, the other on

the anterior surface of the right arytenoid. Tuberculous laryngitis was finally suspected, not so much from the physical character of these growths as from the following data: the entire larynx, including the involved areas, was uniformly pale; there was a progressive and considerable loss of weight following the subsidence of the acute infection; the physical and roentgenologic appearance of both lungs was normal, and there was a history of a similar acute septicemia in this man's 14 months old baby, with secondary spina ventosa of the left index finger. However, these growths were removed, and laboratory reports confirmed the clinical diagnosis of primary tuberculous laryngitis, apparently of exceedingly rare occurrence.

This case is unquestionably interesting. Usually tuberculosis of the larynx is considered the result of direct inoculation by infected sputum or bacilliferous secretions. On the other hand, certain authors believe in a vascular type of laryngeal tuberculosis, some because lesions predominate around the blood vessels, others because the various results of experimentation point to this type of tuberculosis. The case under consideration stands out as a clinical, living proof that tuberculous infection of the larynx may be of blood origin. The location of one of the growths on the anterior surface of the right arytenoid somewhat lessens the value of the statement that direct inoculation is proved by the development of lesions in areas, such as the anterior surface of the arytenoids, on which usual dorsal recumbency favors constant stagnation of secretions. As to the other growth, there is a special anatomic reason which would account for the vascular origin of the infection in the anterior subglottic region. The author states that cases of ordinary tracheitis show a fairly noticeable vascular area in this region, at the level of which a slow circulation would readily favor infected embolic stoppage. Such anatomic disposition would furthermore explain why inoculation of the carotid with bacilli causes, as in Albrecht's experiments, lesions of the anterior commissure.

AUCOIN, Montreal.

PERSISTING FALSETTO VOICE IN A SINGER. PAUL MOSES, Ztschr. f. Hals-, Nasen- u. Ohrenh. **16**:447 (Oct. 14) 1926.

The cause of a persisting falsetto voice has not been established. In cases in which a disease of the lungs or of the larynx occurs during the time of the change of voice, the disturbance is attributed to these without considering a functional basis. If another somatic stigma is found, such as hypogenitalism or eunuchism, the etiology appears to be established. In these cases, the observations in the larynx are probably always negative. Moses describes a case in point.

In ordinary speech, the patient had coup de glotte. The voice was distinctly falsetto. The slight hoarseness disappeared when "singing speech" was used, namely, prolonged vowels spoken in a deep register. The register of the speaking voice reached from e flat to B; of the singing voice, from b to F. The characteristics of the chest voice prevailed until d sharp was reached, when the voice changed to falsetto.

At rest, the pneumograph curve of abdominal breathing was somewhat slower and more flat than the curve of chest breathing. In reading, the respiration became slower and much more flat. The number of respirations of the patient was double that of a person with normal speech.

While the patient was singing, the number of inspirations was relatively less than while he was speaking.

A simple change of voice had not occurred, as sometimes happens, but a straining of the voice took place during that time. Biaggo showed that in two of his patients the normal register of the voice was restored, following the removal of an impediment of respiration. The deflected septum in the patient described by Moses was not important. In cases described so far, nothing is said about the constitutional type of falsetto. Dalma's investigations have shown that the infantile-eunuchoid voice and the high tenor are found in 50.7 per cent of the schizophrenic patients examined and in only 6.5 per cent of those with cyclic dementia.

AMBERG, Detroit.

ON THE LIGHT TREATMENT OF LARYNGEAL TUBERCULOSIS. AAGE PLUM, Dansk Otolaryng. Selskabs Forhandl. Hospitalstid. **35**:93, 1926.

Strandberg, in 1914, first used general light baths in treatment of laryngeal tuberculosis. Blegvad used it a few years later. Strandberg reported (1924) 53 per cent of recoveries and Blegvad (1922) 40 per cent. An arc lamp was used, the spectrum of which is especially rich in the long wave lengths, violet and ultraviolet.

Cemach and Wessely, among others, have reported the use of light directly on the larynx. Cemach used rays from a Kromayer lamp, which he directed through a tube. Wessely used concentrated rays from a special arc lamp reflected by a mirror into the larynx.

The author goes into a discussion of the nature of light therapy and the properties of different types of rays.

The sunlight presents a continuous spectrum with ultravisible rays at both extremities. The visible spectrum lies between 397 and 760. It is the short wave lengths that have therapeutic value. In high altitudes (mountains) rays as short as 290 are found. The atmosphere filters these, and at sea level the shortest rays are about 313. The spectrum of the arc light is also a continuous spectrum which reaches from 290 far into the ultrared, with its most active rays between 359 and 388. The mercury quartz light gives an interrupted spectrum with its active rays between 200 and 300.

Although the shortest ultraviolet rays are the most active in destroying bacteria, they have the least power of penetration (Finsen). He cites various experiments determining the penetration power of different wave lengths, and their action on the tissues and the reaction of the latter. Penetration is greater in tissue which has been rendered anemic by pressure.

The final conclusion is that the most valuable rays are the "inner" ultraviolet and the blue violet rays.

Local treatment of tuberculous lesions of the mucous membranes at the Finsen Lysiinstitut has been successful on the gums and lips but not in the larynx.

Sorgo (1904) reported a case of tuberculosis of the larynx healed under local treatment. He reflected the sunlight into the larynx. He later treated a number of patients in a similar manner.

Brünings and Albrecht treated experimental laryngeal tuberculosis by different types of light but found no microscope changes due to the light.

Blumenthal and Schroeder (1924) failed to secure benefit from local treatment.

The author suggests a number of factors besides the feeble power of penetration of the rays which may account for failure of local light treatment in the larynx. Among these are the comparatively long distance into the larynx; the loss of rays by reflection; the loss of intensity because of the angle at which

the light falls on the mucous membrane (the intensity is proportionate to the cosine of the angle of incidence); the hyperemia of the tissues, which is usually present and which decreases penetration.

The author concludes that the beneficial action of light in tuberculous lesions is a general reaction and can be obtained by general light baths.

HILDING ANDERSON, Duluth.

Nose

HEMATOMA ABSCESSES OF THE NASAL SEPTUM: THEIR BILATERALITY AND THEIR RELATION TO ERYSIPELAS. P. BERTEIN, Arch. internat. de laryngol. otol. rhinol. **5**:1054 (Nov.) 1926.

Two cases were reported. The first patient had a simple traumatic abscess of the septum three days after an injury. The abscess was opened with a galvanocautery. The patient in the second case developed a septal abscess following a sensation of itching in the nose, which occasioned considerable scratching. Fever continued despite the opening of the abscess, and nine days later an extensive erysipelas developed over the nose and face. The patient recovered, but not without loss of considerable septal cartilage.

The author is of the opinion that most septal abscesses are the result of trauma, and the bilaterality may be due to a fracture of the cartilage. Again, the lower portion of the septum may be the site of the original hemorrhage, causing a luxation of the cartilage, which allows the hematoma to reach the other side. When there is not a fracture or dislocation, the hemorrhage, which may find its predilection at the lower portion of the septum, gradually strips off the perichondrium, which may in a short time cause an erosion through the cartilage. In infectious diseases and nontraumatic cases, the infection causes necrosis of the cartilage.

The development of erysipelas is by continuity. The infection and nasal discharge causes an excoriation of the skin of the alae and vestibule.

ROTH, Kankakee, Ill.

DISTURBANCES OF DEFENSIVE QUALITIES OF THE NASAL MUCOUS MEMBRANE: A PRELIMINARY COMMUNICATION. A. SIMIN, Ztschr. f. Hals-, Nasen- u. Ohrenh. **16**:478 (Oct. 14) 1926.

In spite of the fact that the nasal cavity is rich in micro-organisms, some of which are virulent, complications rarely follow operations. The nasal cavity partially frees itself from these organisms. The author introduced into the nose of a rabbit from three to five drops of a twenty-four hour bouillon culture of *Bacillus prodigiosus*. In certain intervals specimens were procured and planted on agar-agar. In about fifteen hours, rarely longer, (about five hours longer in one case), the nose was free from the microbe. Only in exceptional cases could cultures be grown after twenty-four hours. When five drops of physiologic sodium chloride were repeatedly instilled in one side of the nose, *Bacillus prodigiosus* grew in greater numbers on cultures from that side of the nose than on those from the other side which had not been thus treated. Besides, the micro-organisms lived longer in the side of the nose treated with the saline solution. Almost the same result was obtained by the introduction of three or four drops of a 1:10,000 epinephrine chloride solution, or a 5 per cent cocaine solution with epinephrine (1 drop of 1:1,000 of the latter to 1 cc. of cocaine). Entirely different results were obtained with a from 5 to 10 per cent solution

of nitrate of silver. The solutions were applied twelve hours before the introduction of the culture of micro-organisms, and created a severe coryza. The specimens taken from the half of the nose treated showed fewer colonies than the other, and the colonies disappeared sooner.

Dr. A. Gluchowa is continuing the experiments in rabbits subjected to hunger, low temperatures and alcohol. The experiments have not yet been concluded, but they show, in general, that the nasal mucous membrane is influenced unfavorably. He is also making researches to determine the number of phagocytic cells in the mucus of the nose. Tentative conclusions can be drawn concerning the fact that it is not irrelevant to douche the nose with physiologic sodium chloride and concerning the significance of treatment with a solution of nitrate of silver, etc.

AMBERG, Detroit.

Miscellaneous

ABSCESS OF THE CEREBELLUM (SILENT). PROF. G. FERRERI, Arch. internat. de laryngol. otol. rhinol. **5**:897 (Sept.-Oct.) 1926.

The symptomatology of abscess of the cerebellum is so incomplete that the diagnosis is rendered not only doubtful but sometimes impossible. The scientific literature does not give enough information concerning differential diagnosis of intracranial complications originating in the ear to insure a practical diagnosis of cerebellar abscesses. Heiman and Neuman estimated the abscesses of the cerebellum originating from otitic abscesses at from 31 to 36 per cent and the temporosphenoidal at from 63 to 68 per cent. The same authors gave the age limits as 10 and 30 years, the most acute and rapidly appearing occurring before the tenth year. In cases of rapid development, these abscesses are usually the result of a thrombophlebitis of the sinus or a pachymeningitis or leptomeningitis in the posterior fossa.

The symptoms of compression are analogous to those of any other intracranial suppuration or tumor. The headache, however, is more violent; it is continuous and localized on the affected side, usually in the occipital region. The visual disturbances and stationary pupil in abscess of the cerebellum are ascribed more to papilloneuritis which cannot be proved but which disappears on successful operation. An important sign is that the stasis of the pupil, which is usual bilateral, is more pronounced on the side of the lesion; this may be due to compression by the large vein of Galeni by dropsy of the ventricle. The rapid emaciation, which may be absent in less acute courses, the lethargy and coma, do not especially indicate cerebellar abscess but may be the results of general intoxication. The hypothermia which is sometimes associated with abscess of the cerebellum may result from intoxication of the thermoregulators, while the dysarthria and anarthria of speech may be due to compression of the bulb by increase of intracranial pressure. Compression of the pons may explain the dysphagia often observed. All the symptoms aid in diagnosis, but none of the signs of compression are of any value pathognomonically.

Bárány individualized the anatomic zones. He located various areas of coordination and joint sense; although experimental results in animals have been verified in clinical observations on man, they are not sufficient to permit one to make a precise diagnosis of the site of the lesion in the cerebellum. The falling reaction will as a rule show on which side the lesion is, this is due to the preserving of muscle tone on the sound side. When the abscess develops slowly or is encysted, the symptoms are more easily recognized,

but when the process is more rapid (and this is not the rule), the complications of meningitis and general septicemia mask the observations. When the progress is rapid, the intracranial pressure and bulbar symptoms often cause both the neurologist and aurist to err.

The aurist can again err when a caries of the apex of the bone or circumscribed leptomeningitis or pachymeningitis has invaded the nervous tissue but communicates more or less exteriorly, causing him to suspect the mastoid or the labyrinth. Or the abscess may be deep and attack the gray substance of the cerebellum, so that symptoms of the nuclei (fastigus, globosus, emboliformis) may predominate and lead to a diagnosis of labyrinthitis. Luciani was the first to demonstrate the static functions and the centers domination the muscle tone and the lesions of the cerebellum giving rise to troubles of equilibrium, asthenia and muscular atony, which reveal the specificity of abscess of the cerebellum, but he did not grasp completely the accidents of vertigo, nystagmus and strabismus. The walk may be like that caused by intoxication; the feet are lifted high, and the patient is unable to stand on one foot alone. Muscular tremor and weakness are present. Sometimes the patient is able to walk without staggering, even with his eyes closed. In such a case the finer coordinations may be of value, but may not always be manifest.

The vertigo, nystagmus and strabismus are important. The nystagmus of the cerebellum is generally rotary and always more rapid than tachynystagmus or bradynystagmus. The direction is not constant but depends on the direction in which the patient turns his eyes, which differentiates the cerebellar from the vestibular type; the nystagmus is more marked on the side of the lesion. The vertigo is of the subjective type and associated with the nystagmus.

After all the symptoms have been considered, the aurist is often surprised to find that he frequently makes his diagnosis during the operation or at autopsy.

REVIEW OF LITERATURE ON GRAFT OF BONE CARTILAGE AND FAT IN OTOLARYNGOLOGY. PROF. BOURACK, Arch. internat. de laryngol. otol. rhinol. **5**:956 (Sept.-Oct.) 1926.

Grafts of bone and cartilage were considered in an earlier article. Grafts of fat were first used succesfully by Neuber in 1893 and by Czerny in 1895. This procedure was first used extensively by ophthalmologists in repairing defects of the orbit following enucleation and exenteration of the orbit.

The principal purposes for which grafts of fat are employed, according to the literature, are: For the elimination of suture scars and replacement of deforming cicatrices, especially about the face and neck. Fat has been used to fill bony cavities following osteomyelitis, tuberculosis and such injuries as gunshot wounds. Many of the organic and inorganic substances used as plombs are often extruded as foreign bodies. While most surgeons prefer bone grafts, the use of fat for such grafts is beginning to receive serious consideration. The question of a living tampon in postoperative bone cavities has aroused the interest of otolaryngologists. The treatment is greatly facilitated and less painful, and when the field has been rendered aseptic, the results are gratifying. Lost substance in the dural sac and cranium has been replaced by fat. In 1910, Rehu first proposed this procedure for the treatment of epilepsy. Eden, however, contends with Franse that the fat is too rapidly transformed into cicatricial tissue and cannot replace the dura. Polinob and Sadiguine used fat in stopping parenchymatous hemorrhages of the liver, spleen and kidneys. The author used fat in two violent hemorrhages from the mastoid emissary.

Rehu and Eden used fatty graft to prevent incarceration of nerves and tendons after operations. It has also been used in ankylosis of articulations. Gross, in 1917, used fat graft in a gunshot wound in the lung. He stopped the hemorrhage and closed the bronchial openings. Later, this was followed by the formation of combined tissue which allowed the penetration of insufflated air. Many others have employed fat in lung injuries with success.

The author's experience has not been favorable in osseous and cartilage grafts. He did not find suppuration any more frequently in nasal grafts than in amputations or external operations on the feet. He believes that the graft introduced by the endonasal route is a better procedure than that of external incision, and that most of the suppurations may be eliminated by immediately suturing the endonasal incision. In cases of saddle-back deformity, the original shape cannot be obtained as easily as with paraffin. Most of his bone graft in the nose and larynx had been absorbed at the end of a year. In the grafts of cartilage, there was either a late extrusion of the graft on account of suppuration or an absorption of the cartilage. Ten of twelve cases were failures, and the other two were not observed long enough to give the end-results.

In saddle-back deformities of the nose and gunshot injuries, good results were obtained with grafts of fat. Observation must be carried on for a long time, preferably about four years. While the results are good, the percentage of suppuration is also high. While satisfactory cosmetic results can be obtained in from 70 to 80 per cent of the cases, better results are obtained with paraffin.

CONTRIBUTIONS TO THE STUDY OF FOREIGN BODIES IN THE RESPIRATORY TRACT. B. WISKOVSKY, Arch. internat. de laryngol. otol. rhinol. **5**:1062 (Nov.) 1926.

The author reviewed twenty cases in which foreign bodies were successfully extracted from the air passages, with one mortality. Fourteen of the patients were under 10 years of age. In sixteen instances the foreign bodies were organic. The one autopsy revealed status lymphaticus. Lymphatic children, on account of the inferior physique, the tendency to exudation and the difficulty of respiration, should be regarded with apprehension. The tendency to aspiration is increased in these children on account of mouth breathing, reduced sensibility of the pharyngeal mucosa and the functional insufficiency of the epiglottis. The author cites Brdlik, who found that in 90 per cent of the autopsies he observed following bronchoscopies frank status lymphaticus was present. Aspiration of foreign bodies should also be included among the accidents of dentition.

"When bronchostenosis predominated, our observations were in brief: A marked difference in the two sides of the thorax was observed in two of thirteen cases. Modification of the respiratory tone in seven of fourteen, auscultatory findings in twelve of fourteen cases, but these are evidently not always due to bronchostenosis. Thirteen cases were examined by the roentgen-ray; results were negative in three cases, in eight there was a modification of the transparency, in four the motility of the diaphragm was limited on the side of the stenosis, in two there was a permanent displacement of the mediastinum to the sound side, and in two others the deviation was to the injured side on inspiration."

Exception was taken to the opinion of some authorities that a certain degree of pulmonary emphysema is due to a tracheobronchitis of inflammatory origin.

The author believes that the entrance of the foreign body into the air passages produces a spasm of the musculature of the trachea and bronchus, determining an asthmatoid condition. He cites the absence of an elevation of temperature and the disappearance of the symptoms on removal of the foreign body to support his contention. However, should the intervention be delayed, the inflammatory changes may supervene, and the patient may die.

In two cases in which the obstruction had remained for days the emphysema persisted. This might have been due to the limitation of the blood circulation by the greatly dilatated alveoli or to an inflammatory change which affected resorption. It might also be explained by the fact that air retained in the alveoli soon attains a pressure of oxygen and carbonic acid equivalent to that of the venous blood. Two cases were cited to show that the emphysema is not always due to the valvelike mechanism of the foreign body, typified by an inspiratory dilatation permitting the entrance of air about the foreign body, and the expiratory contraction preventing its escape. In one case a fragment of a cigaret holder with a patent lumen was aspirated, and in another case a flat blade of bone. The obstructed bronchus, on account of its reflex spasm, does not function in its normal manner.

The author observed a case of postendoscopic stenosis by direct laryngoscopy. He noted that the stenosis was not the result of subglottic edema, but was due to a fibrinous membrane. Bacteriologic examination did not show the predominance of any organism responsible for a primary fibrinous laryngitis. The author believed that the membrane was the result of the traumatism incident to the bronchoscopy. In such cases he prefers intubation to tracheotomy. While direct laryngoscopy in dangerously dyspneic patients is not practical, he does not hesitate to intubate. If the patient breathes freely after removal of the tube, and after some hours has a recurrence of the dyspnea, he reintubates. However, if the patient's dyspnea is not relieved after removal of the tube, he believes that tracheotomy should not be delayed. According to the author, intubation should be a valuable procedure in postendoscopic stenosis.

ROTH, Kankakee, Ill.

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AMERICAN LARYNGOLOGICAL ASSOCIATION

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